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CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

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FRIDAY, DECEMBER 6, 1907.

In another column we print a letter from A. W. Heinle, of Pittsburgh, on the recommended rail sections. Mr. Heinle objects that distortion, on the one hand, and imperfect granular structure, on the other, will not be prevented by the proposed sections, but says that he is ready to state, through the columns of the *Railroad Gazette*, how a large rail can be rolled successfully without distortion or curvature, and so that it will cool evenly and separately within its different parts. We hope that he will do so at his earliest opportunity, and we trust that his letter will bring out interesting information and stimulate discussion, especially with regard to the most desirable number of passes.

The official statement in another column of the Yale-Princeton football traffic on the New Haven Railroad has several striking features to which the earlier tabulations of receipts in other years give emphasis. Unfortunately one cannot in all the returns separate the football traffic from the regular business. But the New York excursion business alone on the day reached 13,418 one-way passengers, and the total for both ways, with some local trains added, rises to 21,711. This, however, does not nearly represent the total volume of football traffic. To it must be added the football business of the regular trains unknown but very large, and, besides that, the considerable increment of traffic on the day before and the day after a big game which does not appear in the returns. More impressive are the returns given in receipts for last year of the Harvard-Yale football traffic which shows more accurately the real dimension of a "big" football game at New Haven in which the New Haven road gets the "long haul" from Boston as well as the short haul from New York. The total of \$62,001 of football money carries the single day's revenue in 1906 well towards the average day's passenger receipts on the whole system which may be roughly given as \$70,000 from the whole passenger department. In any computation, too, must be reckoned in the second big game this year played at Cambridge. No direct returns are available for it but the single item of 15,000 admission tickets to the Harvard stadium sold through the Yale ticket agency gives a clue to the volume of the business. Most gratifying of all is the way in which this vast amount of condensed passenger travel was handled. Here upon the lines of a system with extreme passenger density was poured within a few hours a volume of additional passenger traffic represented on the last football day

at New Haven by forty special trains besides the overload of the regular passenger service. The big trains ran on the shortest headway and the New Haven station is far from vast in dimension. Yet the huge traffic was handled back and forth without mishap or even delay worth the mention. Such a record is in the highest degree creditable even on a road used to great currents of the passenger traffic which was ardently extolled by one of the road's old directors as "the freight that handles itself."

That a large majority of railroad officers are opposed on principle to the use of mileage tickets, admits of little doubt. For reasons of policy most of them keep their opinion to themselves; but at Albany, before the Public Service Commission, last week (*Railroad Gazette*, page 666), two or three of them spoke out with refreshing frankness. It would be good if this Albany example should be followed elsewhere. The mileage ticket is simply a dam to hold back the flood of public opinion when public opinion ignorantly demands that fares shall be made lower than the railroads can afford to make them. Legislatures or "commercial travelers" demand a low rate and the mileage ticket, available only for persons who are ready to pay for a lot of rides some time in advance, is the most convenient means of satisfying this demand without at the same time reducing fares to everybody. The excuse is the "wholesale principle"; but this is a false argument, except as regards the clerical labor of selling the tickets, for the riding is at retail. Users of mileage tickets do not ride in bunches, any more than when they traveled on ordinary tickets. The clerical labor of collecting and auditing the coupons is far greater than that saved by the change, and the work of the conductors is much increased. A dishonest conductor, however, will comply willingly, for, as has been found by experience, the mileage ticket is a very convenient thing with which to juggle, in conspiracy with a dishonest passenger, to cheat the railroad company. From the average state commission one can hardly expect a scientific decision on this subject. For knowledge of the railroad side the commissioners have to depend on the testimony of officers with minds distracted by opposing opinions and in some cases unwilling to tell all they know. On the other side the most numerous class of passengers, those not traveling regularly or all the time, is far less conspicuous in demanding its rights and expressing its desires than the class which wants mileage tickets. The Albany Commission, however,

is far above the average, and we may expect a philosophical study of the situation. By the most rational theory the fare should be fixed at some figure, below the present single trip rate and above the mileage book rate, at which the railroads could afford to carry all passengers alike, except when they travel in parties or excursions large enough to justify a reduction on the true wholesale principle. Probably this figure could not be closely calculated, except arbitrarily. Mr. Wood, of the Pennsylvania, said at Albany that his road was giving the mileage-book riders \$1,500,000 a year. Assuming that this represents a reduction of 20 per cent (from $2\frac{1}{2}$ cents a mile to 2 cents) it means that the benefit went to passengers paying the company (after the reduction) \$6,000,000 yearly. But the total passenger receipts of Mr. Wood's lines are about 44 millions a year, so that other passengers, paying the road 38 millions, enjoyed no reduction. Half of this sum, or 19 millions, probably came from passengers paying over 2 cents a mile. If the $1\frac{1}{2}$ millions had been divided among all these, the average reduction would therefore have made the average fare of these passengers much nearer $2\frac{1}{2}$ cents than 2 cents. If the Pennsylvania were to give the 2-cent rate to all passengers who have been paying more than that, it would reduce its passenger receipts probably about six millions.

CAR EFFICIENCY IN PROSPEROUS TIMES AND DULL.

We have several times taken occasion to comment on the excellence of the reports of the Car Efficiency Committee of the American Railway Association, with their fullness of detail constantly increasing as the shyness of some of the backward companies wears off, but the reports only partially reveal the work of the Committee. The address which Arthur Hale made before the New York Traffic Club, November 26, discussed rather fully some of the Committee's aims and the measure of its accomplishments, and it is quite without exaggeration to say that in the brief half-hour's talk, Mr. Hale gave to his audience more real information about car efficiency than was available from any source whatever, as recently as a year ago.

It seems that, at the outset, the Committee itself was scarcely able to explain why it sought so earnestly to obtain the detailed information from the railroads, except that it was convinced that this information ought to be in somebody's hands. People have assumed, for example, that the car congestion of the fall and winter of 1906 was the worst in the history of the country, but nobody knew or could possibly know whether this was so or not, because no comparative statistics were available. Moreover, although the Committee itself took great pains not to point comparisons between roads, it was obviously desirable that the roads should be able to make these comparisons for themselves. If the General Manager or the General Superintendent saw that his freight cars had an average record of 400 ton-miles per car per day, while his neighbors' cars had an average of 350, he would know that he was doing well. If, without the assistance of predominating coal traffic, he attained an average of 450 ton-miles per car per day, he would know he was doing extremely well, while if he averaged 250 ton-miles per car per day, he would not only know that he was doing badly, but he would know how badly he was doing, for the average for the whole country is around 350. A comparison of this kind is, of course, a very desirable and helpful stimulus, yet it has remained for the Car Efficiency Committee to introduce it at this late hour in our railroad development. Similarly, the General Manager can find out what relation the average daily earnings per car owned bears to the average daily earnings per car on line, and he may thus prove definitely that it is worth his while to build new cars rather than to continue borrowing.

Mr. Hale brought out the interesting point that at the 25-cent rate, in prosperous times, it did not pay anybody to build cars who could steal them, while at the 50-cent rate it did not pay anybody to borrow cars who could build them, the average cost of owning a car, including interest and depreciation, figuring at about 37 cents a day. Consequently, the introduction of 50 cents per diem, together with the full working information supplied by the Car Efficiency bulletins, may be assumed to have occasioned the building of a great many cars this year that would otherwise not have been built.

But a peculiar and interesting circumstance has an important bearing on the results reached by the Committee. The Committee has done all its work, so far, in a time of car shortage. Its values are calculated for times when traffic exceeds facilities, and the same thing is true of the 50 cents per diem. But, broadly speaking,

at the present time cars are scarce only in the coal trade. Elsewhere there is a surplusage of equipment, which is becoming greater and greater every day. It remains for the next few months to disclose whether the 50 cents per diem rate is going to result in a scramble by the roads to get their own cars off their lines instead of the characteristic strenuous efforts of the last year to get their own and other people's cars on their lines. If so, the 50-cent rate is going to do harm, and may perhaps have to be amended temporarily. For example, the Baltimore & Ohio is now beginning to return cars to their owners at large cost at just the time when economy is urgent. Yet the manner of temporary amendment is so cumbersome that it seems to us likely that it will be effected through the individual initiative and agreement of a half dozen roads, rather than through action at the April meeting of the American Railway Association. The per diem rate bears a certain rough analogy to the price of gold; cars will flock towards the premium in dull times and nearly disregard it in busy ones, and a semi-annual conference to recommend practice is, of course, insufficiently flexible as a device to keep the rate constantly at the proper balance.

Of course the remedy for this situation is a really efficient method of pooling cars between companies, but this is a matter so beset with practical difficulties that although it was the original object of the Car Efficiency Committee, very little progress has been made. The shipper has a real grievance at points such as Cleveland and Pittsburgh when the railroads insist on western route and eastern route movements, and do not allow finished products to move out, eastbound, in the same car in which raw materials came in from the west. The car is at hand and the goods are at hand, but the car is not allowed to go in the same direction in which the goods must move. Yet, when pooling arrangements are proposed, originating roads, which have a large equipment supply of their own, want their cars back, and are not interested in pooling, while lines which are chiefly participators in through hauls are not at all anxious to compensate owners for the cars they use, but much prefer to take cars when they can get them, without pooling arrangements which place reciprocal burdens upon themselves. Consequently, the large car owner who wants to put a penalty on diversion is the only party at interest who has really been moving vigorously, and his efforts are not at all directed towards the establishment of a system of pooling. It was pointed out by Mr. Hale that all foreign countries except Russia use systems by which each railroad gets its own cars home again as soon as possible; a system expensive both to the carrier and to the shipper, which it is not advantageous to imitate in this country.

The Committee has had better success in another important branch of its work—although this particular task has been a self-imposed one—and that is in its effort to convince shippers that car movement is good and that car delay is bad, no matter from what cause it arises. Every day that a freight car stands idle it incurs for its owners a gross loss, in times of dense traffic, of about \$2.50 a day, as an average for the entire country, and a loss of perhaps \$1 net. The net loss to the coal shipper when a car stands idle is somewhat greater, perhaps \$1.25 a day, because the coal trade probably operates upon a somewhat smaller margin, net to gross, than a railroad does, and when coal does not move for long periods it simply is not burned; other forms of fuel are temporarily substituted or plants are closed. At all events, there is a real loss which is never fully recovered. Mr. Hale admitted that demurrage was the hardest problem with which the Committee was confronted, particularly as the question is now a burning one on account of reciprocal demurrage legislation in the states, but he thought that a good many shippers had been persuaded to expedite movement at sidings and industries and that further progress will be made. The information about the position of a large group of roads as to surplus or shortage, has also enabled the committee to suggest home routings where they would do the most good and yield the most revenue to one party or the other; a form of assistance which should be greatly appreciated by railroads and shippers alike.

Mr. Hale made a closing suggestion which is of first-class importance and has appeared before in the *Railroad Gazette*; that the Interstate Commerce Commission and the American Railway Association should work together more closely. The Association is peculiarly well fitted to supply the Commission with an enormous amount of technical data which it needs, and use is already being made of this data, but the existing state of harmony is surely capable of very great extension, which must necessarily be of the highest benefit to all concerned.

A STUDY IN RAILROAD BAITING.

The economist of a generation or, perhaps, half a generation hence, who looks back upon our present epoch of anti-railroad state legislation, before he solves its problems or even measures its forces, will have to face some striking anomalies. Reasoning from the natural order of things he will be called upon to infer that in the old and highly populated states railroad baiting, so-called, would reach its highest intensities. Changing the tense from future to present, theoretically we should look for an anti-railroad movement soonest and strongest in a region of high and varied industries, many cities and large towns and thickly crossed by railroad lines. It would be New England and Massachusetts rather than the South and Alabama or North Carolina. In a region of the kind first named, the contacts with the railroad of the average community and average man are many and varied whether in his relation as freighter or passenger; in a region of the latter kind those contacts are relatively few—in theory—certainly so as regards passengers. It is in the thinly settled region, where railroad facilities are most craved, that one would expect public opinion and its expression in law-making to be most tolerant and merciful.

For the time being the reverse seems to be true. Radicalism in the public policy toward railroads is most rampant in the states of low rather than high population and in states where railroad lines are relatively far apart. It is true there are some apparent exceptions. The new and drastic railroad laws of Vermont, the Public Utilities statute of New York and the passenger rate mileage law of Pennsylvania are Eastern examples of the exception, though the Vermont instance falls in a thinly settled state, albeit in New England. But in all these states we have yet to wait and find out the teacher and spirit of enforcement, and the presumption is that the outworking of the new statutes will be along law-abiding and considerate lines. In such states we do not find the fierce and almost savage ardor of enforcement as at the South, where one governor holds up a railroad by executive threat; where another governor calls an extra legislative session and signs in a batch twenty-one anti-railroad bills rushed through both houses with scant discussion and most of them likely to be declared unconstitutional; where a conference of governors of three states is held to secure joint and severe anti-railroad legislation; and where one sees such an inequitable railroad hold-up as in North Carolina where, pending the decision of the United States Supreme Court, the railroad must adopt lower fares as against its own "recovery" ticket plan, and they be forced to lose money on fares during the period of litigation even if it wins the suit. Even the states newest made, like Oklahoma and the two Dakotas, where the railroad is the pledge of prosperity, have the anti-railroad ailment in pretty acute form.

One does not have to hunt far, however, to discover why the natural law seems reversed and commonwealths with apparently the fewest railroad contracts are first in the "baiting" order. Such states in this country are mainly agricultural; and agriculture seems to lend itself peculiarly to the railroad and anti-corporation motif, especially when a President of the United States sets the pace and fires the train. It is not merely because agriculture must often depend on railroad rates and "long hauls" to get its product to market. The farmers of Connecticut have thrice balked any modification of the four days car detention law although their railroad business is of the slightest. The cause rather seems to inhere in the nature of the farmer and the influences upon him of his vocation. He is apt to be isolated, not in touch with men in general, with affairs, with other vocations or with the fundamental principles of business. His life is apt to be narrowed down to the bucolic furrow and his special interest fills his whole mental horizon. Hence any agrarian movement encoils him easily. Such was the populist outbreak of the early nineties; such the western anti-railroad impulse of the early seventies; and such, saying nothing of recent anti-railroad legislation of the West, the extremes to which it has been in southern states but confined there somewhat strictly to the cotton-growing regions rather than to the larger towns and cities. As the anti-railroad fever thus seizes a homogeneous industrial group it is in that sense limited. But it becomes serious when the group is so large that it controls the electorates of whole states and their law-making bodies in which politics is apt to interpret with redoubled energy the sentiment of the constituency.

This political phrase of the subject challenges special attention. It is most marked at the south, less so at the west, least in our eastern states but strong in all three great divisions of the country.

The South and its present legislative foray on the railroads culminating in the astonishing new statutes of Alabama may be used as the best illustration. Recent observers of events in the New South have noticed its great industrial development, particularly in manufacturing; but they have also noticed, partly as a request of its own momentum, the tendency of business to separate itself more and more from politics. Commercial business and politics do not mix with civics at the south so much as North and West where, indeed, they do not mix enough. It was even more so in the old slaveholding days but, commercially speaking, the situation was then modified by the aristocratic cult, now all but extinct, which, with all its faults, was at least highly educated, personally honest and versed in economic law. The change is showing itself in the personnel of southern legislatures and to a degree in Congress also. Would such men as Lamar or Wade Hampton be found to-day abetting legislation like that leveled against the railroads of Alabama, and in that state it is a federal Circuit Judge, an ex-Confederate and "old school" southerner, who has just enjoined the amazing new "injunction proof" railroad law—exactly such a statute as a legislature made up from the politics that veer to every popular and demagogical breeze might be expected to enact. To the purely political motive and influence at the south, no doubt, much of the recent rash legislation, sure to be crushed by the courts, must be charged. From the same shifting and erratic motive any southern legislation of the kind is also likely to be transitory.

In the deeper study of these southern legislative raids on the railroads the most cheerful view is their summing up as a power of popular economic education not unmixed with their sharp lesson against high finance and other corporate misdoing. Communities and legislatures learn, on the whole, more from mistakes than from the statutes that prove effective and wise. The process even with the court to aid it, is sometimes protracted and fraught with some calamity. But usually it is short and, whether short or long, its final teaching strikes deep.

Car Service Disturbances.

The New York, New Haven & Hartford has given notice to the Interstate Commerce Commission and to the interested roads that after December 17 it will refuse to participate in through rates on freight from the railroads terminating in Jersey City, except the Pennsylvania. The reason given is that the New York division of the New Haven road is overcrowded with trains, and that the company desires to have this western freight go over the Poughkeepsie bridge. It appears that the number of cars transferred by boat to the New Haven road from its Jersey City connections is 800 daily, of which 500 are from the Pennsylvania and the rest from the other roads. The transfer floats are overworked and there has been congestion at Jersey City. The Central of New Jersey and its western connections have complained of this action to the Interstate Commerce Commission. They declare that the Poughkeepsie bridge route is not in condition to handle any more freight than is now carried over it. The New Haven people say that the dispute between themselves and their western connections concerning the car service rate has nothing to do with the present action; but some of the officers of the other roads claim that, nevertheless, the difficulty about per diem is the real cause. For most of the freight starting from points on the Central of New Jersey the distance to Hartford or Boston by way of the Poughkeepsie bridge would be greater than by way of New York, so that, no doubt, the complaint of the Central of New Jersey is based largely on the reduction which it would suffer in revenue if it were to send freight by the more northern route.

The Boston & Maine and the Boston & Albany have given notice that they will back out of the per diem agreement after 90 days. No reasons are given; but as the New York Central, which operates the Boston & Albany has been very critical in its attitude toward the car service plans which have been adopted at Chicago it may be conjectured that the B. & A. and the New Haven are in sympathy, at least to some extent. As the New Haven owns a big block of B. & M. stock the action of the B. & M. is supposed to have been influenced by the wishes of the New Haven.

If freight traffic becomes dull, an event which, though unexpected two months ago, now seems possible, the position of the roads which claim that 50 cents a day is too high a price for freight cars will be somewhat stronger. It will not be stronger in reason, for the only reasonable basis for car interchange, under present general conditions, is for every road to furnish as many cars as it uses, thus making the rate unimportant, relatively; but the objectors can get more friends to support their arguments. Borrowers can get cars more easily, and roads with a surplus will be anxious to lend. It may be assumed from the present action that the New York Central is willing to lend to the B. & A.

at less than 50 cents a day; and if to the B. & A., perhaps to the New Haven also.

If and whenever a rate less than 50 cents is fair to the lender the New Haven road's claims ought, of course, to be listened to, not only by the New York Central but by the other trunk lines as well; but still it will be regrettable to have uniformity disturbed even a little. Uniformity is almost synonymous with arbitrariness, of course, and in car service exchanges it often means superficial or temporary injustice; but it is a great promoter of smooth and economical operation nevertheless. It would be easy, of course, for the New York Central to make a separate agreement with the three New England roads to lend N. Y. C. cars to them at the old rate of 25 cents a day or even less. To do so would be only the perpetuation of a method of strengthening its hold on New England traffic, which the New York Central began forty years ago. But the Pennsylvania would have to follow, or else lose some of its New England business, and so the uniform rate would be badly jostled throughout the country. If the Pennsylvania has use for all its cars west of New York it can ignore the reduction, of course.

Well, the New Haven has succeeded in keeping things stirring; who knows but that next May, when it has received its thousands of new cars, it will move for an *advance* in the per diem rate?

In a police court in New York City this week a magistrate ruled that the Grand Central Station was a public place, and that a public porter could go into the station and solicit trade. A porter had been arrested by a special policeman of the Grand Central Station, charged with loitering about and refusing to leave when ordered. The policeman cited a previous decision sustaining his action, but it was not recognized. These "public porters" are a nuisance. Licensed by the city at one dollar a year they hang around the main entrance of the station for the purpose of earning money in performing a service which the railroad company's porters will gladly do; that of carrying hand baggage into the station. But, by meeting people farther from the door, and grabbing their baggage, the self-appointed porters "secure the business," as a G. P. A. would say. A half dozen of them, more or less, seem to make a living at this one point. These porters are a nuisance because they are irresponsible. Wearing caps or badges that look like an official uniform they deceive green passengers into employing them; yet their qualifications are an unknown quantity. Recently one of them led a woman into danger—in front of a team of horses. Boys on the sidewalk a block away from a station asking to carry one's grip are perhaps an incurable nuisance; but grown men, occupying room around a crowded entrance and smoking in passengers' faces, ought to be suppressed by the police.

Chicago Great Western.

As on many other roads, operating expenses of the Chicago Great Western during the year ended June 30, 1907, increased faster than gross earnings. Therefore, although the road had the largest year's traffic in its history, its financial condition is weaker than it was a year ago, both in its income and capital accounts.

The decrease in net earnings was \$253,000, or 10 per cent. The net income after charges was \$1,460,000, against \$1,740,000 in the previous year. The company has no bonds, but interest on its debenture stock though not an absolutely necessary payment amounts to a fixed charge. Net income after debenture interest therefore really represents the amount available for dividends on the three classes of the company's stock, of which a little more than \$78,900,000 is outstanding. This net income was \$414,000 last year against \$695,000 in 1906, a decrease of 40 per cent. As two semi-annual dividends of 2½ per cent. on the preferred "A" stock were paid instead of one as in 1906, there was a deficit from the year's operations of \$153,000, against a surplus of \$412,000 the previous year.

The balance sheet showing is also not encouraging. On June 30, 1906, the company had total cash on hand amounting to \$1,340,920. On June 30, 1907, the cash item was \$224,000. On the same date, bills payable exceeded accounts receivable by \$337,000 and current liabilities exceeded current assets (not including fuel and material on hand) by \$612,000, making a total excess of items payable above corresponding items receivable of \$989,000.

Freight earnings for the year increased 6 per cent., passenger earnings 8 per cent.

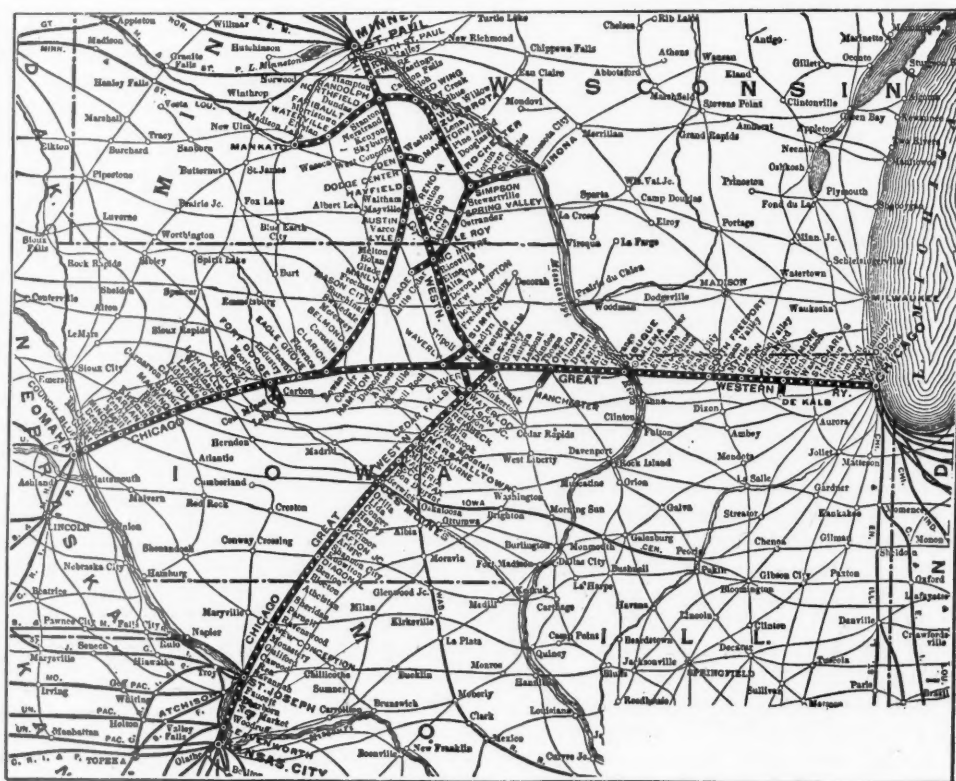
and express earnings 25 per cent. Operation was more efficient than in the previous year. With an increase of 11 per cent. in revenue ton mileage there were only 6 per cent. more revenue freight train miles and 7 per cent. more miles run by helping locomotives in freight service. Loaded freight car mileage both east and westbound increased; at the same time there was a decrease of 14 per cent. in empty freight car mileage eastbound and of 13 per cent. in empty freight car mileage westbound. The revenue trainload rose from 295 tons to 308 tons, or 4 per cent. In comparing this figure with trainloads on other roads it must be remembered that these traffic statistics cover only the 818 miles of the Chicago Great Western proper of which 787 miles are main line. This, therefore, is essentially a main line trainload.

Among the operating expenses, the largest increases were in the maintenance accounts. General expenses increased 4 per cent. and conducting transportation 10 per cent., while maintenance of way "and renewals" increased 15 per cent. and maintenance of equipment 29 per cent.

Maintenance of way cost \$1,027 per mile of line, against \$894 in 1906. This figure is for the largely main line mileage of the Chicago Great Western proper. On the 386 miles of the Mason City & Fort Dodge, including the line from Oelwein to Omaha and the connecting branch to the Minneapolis line, maintenance of way cost \$438 per mile, against \$372 in 1906. The Wisconsin, Minnesota & Pacific, operating most of the branch lines, spent an average of \$470 per mile in 1907 and \$415 in 1906 on each of its 271 miles. This makes a total maintenance of way expenditure for the 1,476 miles of the whole system of \$770 a mile, against \$669 in 1906. Of this 1,476 miles, 1,151 miles, or 78 per cent., is included in the main lines to Chicago, Minneapolis, Omaha and Kansas City. An average maintenance of way expenditure of \$770 a mile is small, even for a prairie railroad, particularly when less than one-quarter of its mileage is branch line. As an extreme contrast, the Burlington with about 50 per cent. of its mileage branch line spent \$1,584 per mile last year. The \$1,027 spent on the Chicago Great Western proper might well have been the average for the whole system.

There was spent on capital account during the year \$936,000 for new equipment, including 480 box cars of 70,000 lbs. capacity and 320 stock cars and 100 furniture cars of 60,000 lbs. capacity. On line improvements \$1,400,000 was spent, of which the largest items were \$252,000 for an extension of the freight house at Chicago and \$365,000 for double track between Galena Junction and Stockton, 27 miles east. During the summer this work was continued from Galena Junction west to Dubuque, and this section is reported to be now finished. This, with five miles of double track directly east of Oelwein, makes a total of 46 miles of double track on the 240 miles of line between Oelwein and Chicago. This line connects all the rest of the system with Chicago and carries a traffic larger than it can economically handle as a single-track line. Double tracking of the remaining 200 miles is greatly needed.

President Stickney makes no comment whatever on the year's results or the prospects for the future. One incident which may be mentioned is the report of a committee of the Minnesota Senate



Chicago Great Western.

made last April to the effect that the road was worth only \$28,000 a mile, but was capitalized at over \$140,000 a mile. Of course, this latter figure represents the total of securities at their par value. Chicago Great Western preferred A stock is now selling at about 30, the preferred B at 10 and the common stock at 8. The committee also reported that the company was carrying at full cost on its balance sheet locomotives now in the scrap pile. This is a more vital criticism. If true, it means that the company has not been maintaining its equipment. The statement of locomotives owned seems to bear out this contention, for in 1907 there were only 259 locomotives as compared with 265 in each of the three previous years, while no deduction was made from the balance sheet item "equipment" to show this decrease. It is noticeable that since 1903 the company has had no new locomotives and that last year, the busiest year of its history, it had less locomotives than in any of the preceding three years.

The Chicago Great Western is capitalized on the English plan and derives most of its strength from the support of its English shareholders. Last summer President Stickney was able to secure a loan abroad on terms reported to be more favorable than stronger roads could get in this country. Its policy has always been not to accumulate a large surplus, but to pay out most of its net income to stockholders. An industrial depression may furnish an interesting test of the reserve power in hard times of a company which has followed this policy. Already it has begun to suffer. In the three months of July, August and September gross earnings decreased 4 per cent. and net earnings 36 per cent., while the operating ratio rose from 69 to 77 per cent.

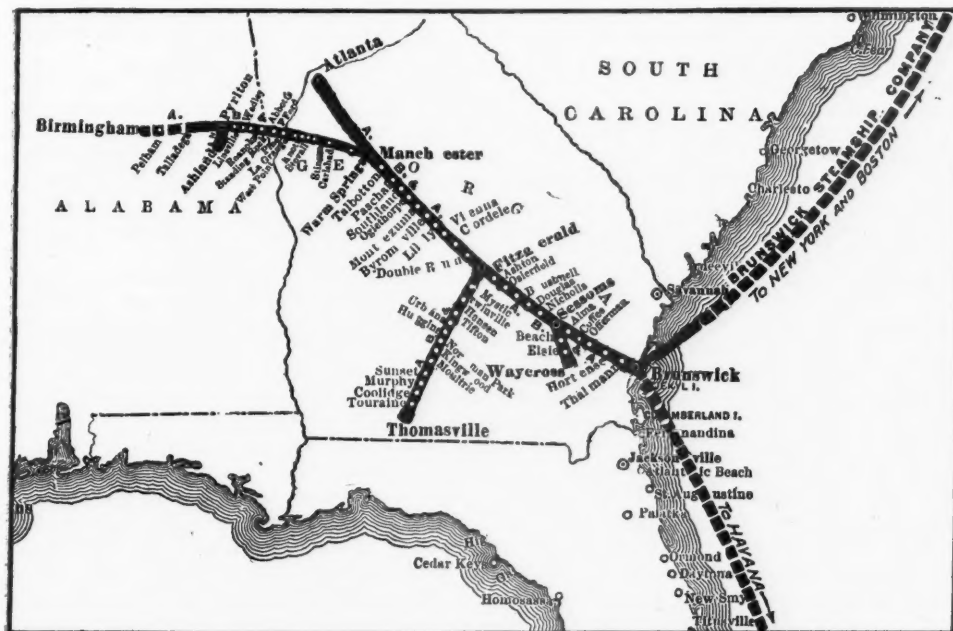
The following table gives for the Chicago Great Western proper the results of the last two years:

	1907.	1906.
Mileage worked	818	818
Passenger earnings	\$2,148,219	\$1,984,403
Freight earnings	6,333,699	5,993,374
Gross earnings	8,859,047	8,345,717
Maint. way and structures	840,101	730,961
Maint. of equipment	1,263,502	982,709
Conducting transportation	3,974,991	3,617,125
Operating expenses	6,583,808	5,817,655
Net earnings	2,275,239	2,528,062
Surplus earnings of prop. lines	280,040	227,431
Net income	1,459,010	1,740,304
Interest on debenture stock	1,044,978	1,044,978
Net income after debenture int.	414,032	695,326
Dividends	566,845	283,423
Year's surplus	152,813*	411,903

*Deficit.

Atlanta, Birmingham & Atlantic.

Two small railroads in southeastern Georgia were the nucleus of the Atlanta, Birmingham & Atlantic—the Atlantic & Birmingham and the Brunswick & Birmingham. Both of these together carried



Atlanta, Birmingham & Atlantic.

the line only as far as Montezuma, 194 miles northwest of Brunswick. From here the road has been extended westward until now track is laid as far as Talladega, which is about 75 miles from Birmingham, and track laying on the 76-mile branch to Atlanta is just being finished. It is expected that grading on the Birmingham line will be finished by March 1, 1908, and track laying somewhat later. Terminals are being built at Birmingham, Atlanta and Brunswick. The Brunswick Steamship Company is owned by the Atlanta, Birmingham & Atlantic and now has four steamships in operation be-

tween Brunswick and New York. A fifth steamer is to be completed this month. There is also a semi-monthly service between Brunswick and Havana. The new extensions, particularly the one to Birmingham, are likely to change the road from a local to a through carrier. Coal and iron companies affiliated with the railroad own mineral tracts in the district about Birmingham. The new road should also get traffic from the Illinois Central and the St. Louis & San Francisco, which it will reach at Birmingham. No doubt a through route will be developed from New York via Brunswick and Birmingham and over one or both of these roads to the Mississippi valley region and the Southwest.

The new construction is being financed through the funds received from the sale in May, 1906, of \$8,000,000 5 per cent. 4-year joint notes of the Atlanta, Birmingham & Atlantic and the Atlantic & Birmingham Construction Company, which is building the new extensions. These notes are secured by stocks and bonds of the Brunswick Steamship Company, stock of the allied coal and iron companies and common stock, preferred stock, equipment notes and first mortgage bonds of the railroad. The total advances on June 30, 1907, to the Atlantic & Birmingham Construction Company by the railroad company were \$18,260,500.

With an increase of 70 miles, or 22 per cent., in the average mileage operated, gross earnings rose last year from \$1,130,000 to \$1,590,000, or 41 per cent. Operating expenses increased 48 per cent., leaving net earnings of \$419,000, against \$339,000 in 1906, a gain of \$80,000, or 24 per cent. These results made an increase in the operating ratio from 70 to 74 per cent. Fixed charges increased from \$271,000 in 1906 to \$368,000, owing to the larger amount of bonds outstanding. As this increase was larger than the gain in net earnings, the net income of the year was less—\$49,000 against \$74,000 in 1906. This is a decrease per mile of road of 45 per cent. This result is due, according to President Atkinson, to the fact that construction work has been going on over nearly all the road from Brunswick to the end of the track. The road therefore was operated under disadvantages. In order to put the railroad as a whole in shape for carrying through traffic, it seemed wise to bend every effort to finishing this construction work, even though it interfered with the operation of the line already built. Increased cost of fuel, wages and taxes have also done their part in reducing the year's profits.

Freight earnings increased 40 per cent. as a whole, and 15 per cent. per mile of road; passenger earnings increased 29 per cent., and 7 per cent. per mile of road; while gross earnings increased 41 per cent., and 16 per cent. per mile of road.

Maintenance of way increased 56 per cent., maintenance of equipment 47 per cent. and conducting transportation 46 per cent. The unit maintenance charges are interesting because the road has been under construction or reconstruction. Maintenance of way cost \$595 per mile, against \$463 in 1906. The 1907 figure will be found inadequate if a large through traffic is developed.

Repairs and renewals of equipment cost \$1,513 per locomotive, against \$1,427 in 1906; \$406 per passenger car, against \$609 in 1906, and \$22 per freight car, against \$32 in 1906. All of these figures are low, and the freight car figure very low. This is largely due to the fact that the company has recently bought a large amount of new equipment of modern standard. Its old freight equipment is light and of small capacity, but it is not yet suffering from operation in heavy through trains. The old and lighter freight cars are probably held on the line for the local freight traffic.

The Eastern Railway of Alabama and the Alabama Northern, two small roads connecting with each other at Pyriton, Ala., were bought during the year from the Louisville & Nashville. The 20-mile line of the former is to be used as part of the Birmingham extension. The Atlanta, Birmingham & Atlantic has had the misfortune to be carrying on its construction work at the time of a financial crisis. It is reported, however, that it has funds in hand to carry out its plans for the development of its system. With its extensions and terminals completed, its old roadbed reconstructed, its new lines built to modern standards and its steamship line, it should come to be an important outlet from Georgia and Western Alabama to New York and the

East. The following table sums up the results of the last two years:

	1907.	1906.
Mileage worked	393	324
Passenger earnings	\$360,593	\$278,591
Freight earnings	1,083,129	771,939
Gross earnings	1,589,148	1,128,327
Maint. way and structures	233,722	149,977
Maint. of equipment	213,916	145,141
Conducting transportation	636,331	434,826
Operating expenses	1,169,935	788,984
Net earnings	419,213	339,343
Net income	49,077	73,858

Toledo, St. Louis & Western.

The Toledo, St. Louis & Western had in two respects a different experience during the past year from most railroads in this country. In the first place its gross earnings decreased; in the second place its operating expenses decreased still more, so that net earnings were the largest in the company's history. This second very favorable result can be traced directly to the fact that the road during the year received 500 new coal cars and 750 new box cars, all of 80,000 lbs. capacity. The two largest single savings among the individual operating expense accounts were in per diem payments, which were \$84,000, against \$202,000 in 1906, and in repairs of freight cars, which cost \$133,000, against \$206,000 in 1906. Furthermore, the new cars made possible a much heavier trainload. This was 471 tons, against 398 tons in 1906, an increase of 18 per cent. Correlative with this was a reduction of 6 per cent. in the loaded and of 26 per cent. in the empty freight car mileage, and a saving in the amounts paid for freight conductors, brakeman, engineers and firemen, engine dispatchers, wipers and roundhouse laborers, and fuel for locomotives—this with 359,000 more tons of freight hauled during the year. The average haul, however, decreased from 221 miles to 197 miles, and earnings per ton and per ton-mile fell off, so that freight earnings and also gross earnings were less than in the previous year. Nevertheless, as a result of these various operating economies, there was an increase of 16 per cent. in net earnings. The 1,250 new freight cars cost \$1,217,375, on which one year's interest at 5 per cent. amounts to \$60,869. In this one year at least, an interest charge which may be estimated at this amount seems to have been the direct cause of an increase of \$190,000 in net earnings.

With one exception the unit maintenance charges are little changed from the previous year. Maintenance of way cost \$1,229 per mile of road, against \$1,238 in 1906. Repairs of locomotives (no renewals appear to be included in any of the maintenance of equipment accounts) cost \$2,588 per locomotive, against \$2,501 in 1906; \$851 per passenger car, against \$831 in 1906, and \$35 per freight car, against \$76 in 1906. The fact that the 1907 freight car figure is less than half of the amount spent in the year previous is the direct result of the increase of 39 per cent. in the number of freight cars. The previous year's figure was high because the older freight cars, particularly since they were overburdened with traffic, needed heavier repairs than normal. Last year's figure is low, because 188 old cars had been disposed of and one-third of the freight equipment were new cars.

The road is a through line from the Mississippi river at St. Louis, Mo., and at Alton, Ill., northwest to Lake Erie at Toledo, and over the Detroit & Toledo Shore Line, which is controlled jointly with the Grand Trunk, to Detroit. It has no branch lines. Its traffic is highly competitive and moves at low rates. With 34 per cent. of its tonnage made up of manufactures, merchandise and miscellaneous, its average rate is little more than one-half a cent per ton mile. Last year there was a great development of bituminous coal tonnage, which rose from 20 per cent. of the total to 29 per cent. Mineral products, as a whole, make up 37 per cent. of the total tonnage; agricultural products, 16 per cent.; animal products, 5 per cent. against 10 per cent. in 1906, and forest products, 7 per cent. The most marked decrease during the year was in packing-house products other than dressed meats, the tonnage of which decreased from 113,000 tons to 34,000 tons.

Recently the road has assumed a new prominence through its purchase in August of a property much larger in mileage and in earning capacity—the Chicago & Alton. The process of combining the two properties is already under way. The executive, financial and accounting departments are now being combined, and it is probable that eventually the two roads will be operated very much as one property. This acquisition brings the "Clover Leaf," as the Toledo, St. Louis & Western is generally called by traffic officers and shippers, as far west as Kansas City. As soon as the short connecting line from Panama, Ill., west to Litchfield is built, new through traffic between Kansas City and Toledo and Detroit should be developed. The extent of the combined system is shown on the accompanying map.

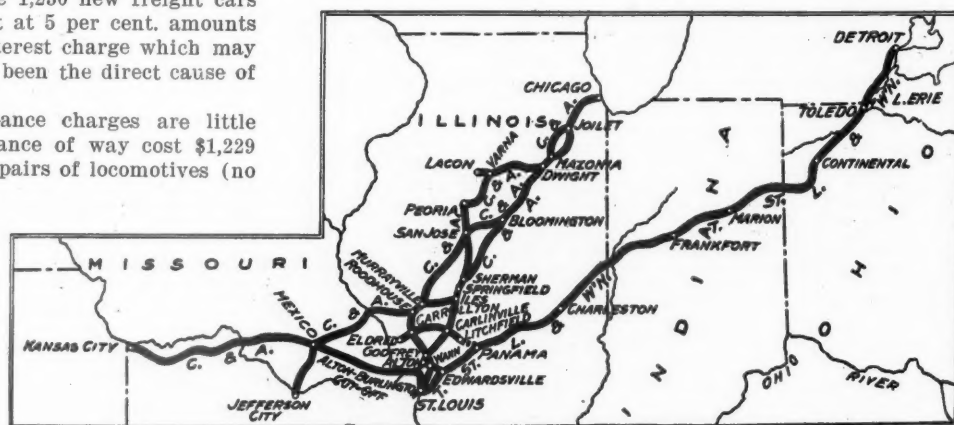
Results for the years ended June 30, 1907 and 1906, are shown below:

	1907.	1906.
Mileage worked	451	451
Passenger earnings	\$547,017	\$549,967
Freight earnings	3,445,402	3,468,593
Gross earnings	4,181,966	4,205,051
Maint. way and structures	554,683	558,145
Maint. of equipment	488,768	558,287
Conducting transportation	1,454,842	1,615,474
Operating expenses	2,803,155	3,016,026
Net earnings	1,378,810	1,189,025
Net income	645,067	472,324
Dividends	200,000
Year's surplus	445,067	472,324

NEW PUBLICATIONS.

A Text-Book on Roofs and Bridges. Part IV.—Higher Structures. By Mansfield Merriman and Henry S. Jacoby. Third edition; revised and enlarged. New York: John Wiley & Sons. 374 pages; 6 in. x 9 in.; 181 illustrations; cloth. \$2.50.

As its name implies, this book is intended as a text-book for the student and not simply to be read by the engineer. It has apparently been prepared for the classes of the two professors who are the authors and who are at the Lehigh and Cornell universities respectively. It is a continuation of the previous parts I. to III. of the same work, and deals with those structures which have more than two supports, as continuous, draw and cantilever bridges, or which have two supports, whose reactions are not vertical, as suspension and arch bridges. The investigations given are those of the theory of stresses and their determination by analytic or graphic methods, with no attention whatever to the details of construction or erection beyond the bare description of the general types represented by those structures that are selected for purposes of illustration. With this limitation the book necessarily deals almost exclusively with bridges to the exclusion of roofs proper, though the latter are represented in the discussion of two and three-hinged arches as applied to train sheds. The discussion of this part of



Toledo, St. Louis & Western and Chicago & Alton.

the subject is in great detail; the actual maximum and minimum stresses being computed for several cases. This for three-hinged structures, while, for arches with two hinges and with no hinges the reactions are determined analytically and the stresses by simple graphic constructions. In this especial emphasis is placed upon the importance of proper methods of erection in order to hold the subsequent stresses down to a minimum. For example, it is shown that, for a no-hinged arch it is well to erect and join as a three-hinged structure, changing then to a two-hinged and finally to a no-hinged in order to compensate for the dead load and temperature stress due to inequalities of conditions during erection.

The method of presentation of the subject is to state the proposition as the heading of an article, such as the "Deflection of a Swing Truss" or the "Anchor Span," and then, after a brief statement of the question involved to enter at once upon the mathematical or graphical solution of the case. Usually these articles, which are really sub-heads of the several chapters, conclude with the presentation of a problem that is left for the student to solve. Sometimes it is of a purely theoretic or hypothetical character, while again it is the determination of the stresses set up in some structure that has been erected and is in service. Incidental to this work the adaptability of various types of bridges to different classes of traffic is shown, and the reasons that should govern a choice, as in the case of the preference of a two-hinged to a three-hinged bridge for heavy railroad work for example.

The chapters on suspension, two-hinged and no-hinged arch bridges open with a brief historical sketch of the introduction and development of the types which is sufficient to give a clear idea of what has been done. And all through the book there are references to an elaborate series of illustrations accompanying the last chapter on modern bridges of all of the types discussed. In this chapter, instead of increasing the size of the volume by complete descriptions of the structures illustrated, there is simply an excellent half-tone engraving of a bridge with a caption stating its character and accompanied by a paragraph that merely refers to the engineering publications in which a description of that specific structure can be found. In this way the book becomes not only a text-book adapted to the needs of the student who is at work upon the theories and intricacies of bridge stresses, but a valuable book of reference for those who wish to examine in detail the methods of construction and design of modern examples of those types of bridges that fall within the general scope of the work.

CONTRIBUTIONS

Train Robbery in Russia.

The Recommended Rail Sections.

Grafton Station, Pittsburgh, Pa., Nov. 27, 1907.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Regarding the respective merits of the rail sections shown in your issue of November 22d and those proposed by the rail committee of the American Railway Association on Rail and Wheel Sections, prompts me to ask the following relative questions. Aside from the mathematical value of these sections, what real benefits do the proposed forms disclose, and where do the designers expect them to contribute to the betterment of the granular structure of large rail sections? Will they actually have any practical advantages in rolling, and enough to compensate for the additional metal which has been added at the flange points?

If the diametrical effects of certain roll surfaces cause a passing or sliding of the crystals where longitudinal tensions take place in the base of the rail now, what benefits can be expected by just increasing the thickness of the whole flange and permit the identical mechanical conditions of the rolls to remain unchanged? Further, will these sections, with a little more material in a uniform flange, prevent the chill of the metal traveling slower toward the rail head, resting there last, and forming a crystalline structure? Will not this condition in cooling be about the same as found with the 90 or 95-lb. standard section, with the exception that larger sections will cool slower, with the resultant crystallization coarser? It ought to be well known by this time that metal 1 in. x 4 in. cools about 50 per cent. faster than the same area 2 in. x 2 in.

If these sections are increased in height, with the base remaining about the same width as in the old sections, what is to prevent the metal in the head from swinging in a curve at a more rapid rate over the flange in the rolling, and effectually setting-up a greater disparity in elongation on opposite sides of the section? Quite enough trouble is already experienced from curvature in rolling a rail where the height equals the width, while if the height exceeds the width a corresponding increase of curvature can be expected. If more roll passes are demanded, together with less reduction per pass to reach low finishing temperatures, what will eventually happen? There is only one result, distortion, unless the form of the flange is changed in a manner to promote an equal elongation.

The mechanical actions of the rolls on the thicker flanges will have no more effective advantages than in the present practices, unless the thicker flange is expected to keep the metal in a more workable state, by reason of being slightly warmer. But in consideration of the fact that larger ingots will be contemplated and more roll passes will also be required to reduce to the desired sized bloom, then the metal in the flange points will become as nearly refractory as in the present practice. This being the case, what diametrical roll influences are going to elongate the metal uniformly on both sides of the section, or rather the flange and the head, and pass them at the same speed safely through more roll passes?

With the general shape of the rail flange unchanged, how are the parties responsible for these new designs going to clear up the fact that larger rails must be continuously rolled to gain toughness, stiffness, tenacity and granular superiority by reason of colder rolling? While if they are aware of this requisite, how is the present or proposed large rail shapes going to safely reach the final passes in the rolls without excessive curvature and distortion; which in turn necessitates gagging. On the other hand, are the proposed sections purposely designed to suit rolling in fewer passes, to assist rapid and economical manufacture at the expense of the final granular structure? Is not the elimination of roll passes an inevitable approach to a "cast-steel" rail?

So far as the rolling of these new sections is concerned, it would seem to be a digressive step, and that the inclination is towards a rail made in the laboratory. The sections as they now are, represent nothing more than an intentional disregard for the mechanical features that was so apparent and beneficial in former days, and where a good rail was produced from poorly regulated properties while other good factors were supplemented by the use of many more roll passes with less reduction per pass. More roll passes and colder rolling is the only compensation for chemical shortcomings in either the Bessemer or the open hearth process.

I am prepared to state through the columns of the *Railroad Gazette* how a large rail can be successfully rolled without distortion or curvature, and will cool evenly and separately within its different parts. If the railroad officials desire a strong and lasting rail, why not design one that is more in accord with the fundamental principles for rolling it and where the proper mechanical effects can be applied in the rolls and thus produce a rail of superior internal character something more than a mathematical figure which invites a return to molecular crudeness.

A. W. HEINLE,
Consulting Roll Turner.

Russia seems to have taken the lead in train robberies, in which heretofore we have had the first rank. The latest was in north-western Russia, the train carrying collections from stations, under the guard of three policemen. Just after leaving a station, two men with pistols appeared in the car carrying the money. They opened fire on the cashier in charge and wounded him. A policeman fired on the robbers, who ran out of the car, shot down one of the policemen who got in their way and killed one passenger and wounded another by stray shots. One robber climbed to the roof of a car and there was shot dead and the other was killed as he was jumping from one car to another. Meanwhile the engine-man knew nothing of it and kept on to the next station. One of the policemen had, at the first alarm, cut the bell rope, which probably prevented an accomplice from signalling the engineman to stop in the woods, where the main force of the robbers is supposed to have been stationed.

The Crops of 1907.

The following extracts are taken from the 1907 report of the Secretary of Agriculture to the President of the United States:

It has been a year of untoward conditions requiring all the industry and skill of the farmers to grow an average crop. They have struggled not only with an erratic season but with a scarcity of help in all the states and territories of the Union. Such a year as 1907 has been, with its hard winter, summer weather in March, and late cold spring, gives exceptional emphasis to the wisdom of this department's policy of diversifying farm products and of establishing new crops. A general crop failure in a field as large as the chief part of the temperate zone of a continent must be a rare occurrence.

No general crop failure afflicts the farmer this year, not even within small areas. The production of the farms, all things considered, is well up to the average of the previous five years in quantity, while its value to the farmer, as now appears at this annual day of reckoning, reaches a figure much above that of 1906, which by far exceeded any previous year's wealth production on farms.

Out of the farming operations of 1907, the railroads will get an average haul of freight, and foreign countries will take a heavy excess above home consumption. The farmer will have more to spend and more to invest than he ever before had out of his year's work.

DURUM WHEAT.

When the Department of Agriculture brought durum wheat to this country from Russia and Africa during 1899 to 1902 the seed was sown that formed practically the entire foundation of the present crop of durum wheat. At a cost of \$10,000 in the beginning, a crop worth \$30,000,000 now grows in regions of low rainfall, where in the day of stock ranges the steer roamed on 20 acres to find his cud. This crop has encroached on the home of the prairie dog and of the cactus. It has spread throughout a wide strip of country, extending from northern North Dakota to south-eastern New Mexico and northwestern Texas. It is a common crop in Montana and Idaho and in parts of Washington, Oregon and Utah.

This variety of wheat has entered into home industries. To a considerable extent it is mixed with other wheat in making flour for bread. It is promoting the manufacture of macaroni and kindred paste products in this country and is prepared as a breakfast food. It is the grain through which the desert feeds the cities of the east at home and abroad.

As an export crop durum wheat has become prominent. In 1905 Europe took nearly 10,000,000 of the 20,000,000 bushels produced; in 1906 about 20,000,000 bushels of the crop of that year.

Last year two-thirds of the exports went to Mediterranean countries. The former sheep and cattle ranges sent macaroni material to Marseille, Naples and Venice; to Greece, Spain and the countries of western Europe; and even to the old homes of durum wheat—northern Africa and Russia. Shipments of this wheat were made to 43 ports in Europe and Africa named in trade reports of the collectors of customs, and to other ports unnamed.

With an average production of about 15 bushels per acre, durum wheat this year covered an area of over 3,000,000 acres, many of them valueless for agricultural purposes before the advent of this new crop. Its value to the farmer is over twice the entire cost of the Department of Agriculture during the current fiscal year, including the Weather Bureau, the costly meat inspection, and the Forest Service.

BEET SUGAR.

The beet-sugar industry in this country had not advanced beyond experiment and given promise of prominence until about 1888. Since that year it has rapidly grown, under aid and encouragement from the Department of Agriculture and the experiment sta-

tions and with favorable legislation by Congress and several state legislatures.

About 560 short tons of beet sugar were made yearly from 1879 to 1887; in 1891 the quantity was 6,000 short tons; in 1892, 13,460 short tons; in 1893, 22,344 short tons; in 1897, 45,246 short tons; in 1899, 81,729 short tons; in 1901, 184,606 short tons; in 1903, 240,604 short tons; in 1906, 483,000 short tons, and in 1907, 500,000 short tons.

Sugar factories occupy a belt across the continent in the sugar-beet zone and a belt from Washington to Arizona along the Pacific coast. From the easternmost factory in western New York they extend through Ohio, Michigan, Illinois, Wisconsin, Minnesota, Kansas, Nebraska, Montana, Colorado, Utah and Idaho; and from eastern Washington through Oregon and California to southern California and Arizona. In 16 states there were 64 factories in 1906, with a capacity of working 49,500 tons of beets daily. Factories with more than three-fifths of this capacity are situated in the western division of states, and in that region this new crop has so well established itself and the growing of sugar beets has proved to be so remunerative that sugar-beet farms of the medium sort increased in value \$42.49 per acre from 1900 to 1905, as determined by special investigation by the Department of Agriculture, or from \$99.47 per acre in 1900 to \$141.96 in 1905.

To the fostering of this industry by nation and states, to the instruction provided by the Department of Agriculture, by experiment stations, and by agricultural colleges, it has responded by increasing the value of its production 543 per cent. in nine years. The factory value of the refined sugar made in 1899 was \$7,000,000, and in 1907, \$45,000,000. More than \$60,000,000 is now the value of the beet-sugar farms and factories.

One-third of the value of the beet-sugar made this year would be enough to pay the cost of the Department of Agriculture during the current fiscal year and the National expense of the 60 experiment stations of contiguous United States when they shall have received the ultimate appropriation of the Adams Act.

ALFALFA.

Alfalfa, that extraordinary plant for producing wealth and doing wonders to farms, is occupying an important place in the plans of the Department of Agriculture, the experiment stations, and the agricultural colleges. Through their efforts largely it has rapidly gained success in cultivation throughout a vast area. The value of the crop as hay this year is supposed to be \$100,000,000, and if the plans and efforts now under way to promote its extension receive a reasonable reward the value of the future crop will be several times the present amount.

This forage plant is a chemical laboratory in which nitrogen is taken from the air. It is a soil improver of the highest merit. As a flesh-forming feed for growing live stock, and as a milk and egg producer, it is unexcelled by any plant of large production.

It grows 2½ tons of hay to the acre as an average for the whole country where it is grown, or twice the average for all kinds of hay, and, besides this, is more nutritious than other hays.

The cultivation of alfalfa has been pressing eastward until now it has established itself as far as the longitude of eastern Kansas, except in southern Texas. It is established in some areas still farther to the eastward—in spots in Arkansas, in southern Wisconsin, northern Illinois and northern Indiana, in the limestone regions of Kentucky and Tennessee, and in the southeastern corner of Michigan.

This plant is semi-established in Minnesota, Iowa, Missouri, Ohio, and is making its way in Illinois and Indiana. Elsewhere the growing of this plant is mostly experimental, but with promise of success.

IRRIGATION.

Among the large efforts that have the effect of giving steadiness to the agricultural production of the nation at times of threatened adversity is irrigation. This is almost entirely confined to the arid and semiarid regions west of the 100th meridian and to the rice coast of the Gulf of Mexico in Texas and Louisiana, but will move eastward as its value is learned. The area now under irrigation is 11,000,000 acres, or a surface equal to the improved farm land of Georgia, or Virginia, or Michigan, or equal to one-third of the cotton area.

At the census average income per acre, with allowance for subsequent increase of price of products, the value of the crops raised on irrigated land this year would appear to be worth at least \$175,000,000, an increase of 75 per cent. over the value of 1899. In 1908 an additional area of 5,000,000 acres will be under ditch and ready for settlement. When this additional area is settled, the total will be 16,000,000 acres. If the new area were at once productive, the irrigated crops of 1908, at the price of 1907, would be worth \$250,000,000 or more, and would support a population of over 1,000,000 persons.

CORN.

Four-fifths of the world's production of corn, as nearly as can be determined, grows in the United States, and in the world's international trade in corn this country contributes one-third to one-half

of the exports, not including the products of corn-fed animals. Fears of a failure or a large degree of failure of the corn crop this year diminished after mid-summer and at last the harvest secured 2,553,732,000 bushels, a production that is almost exactly the average of the crops of the preceding five years. There have been three larger corn crops—those of 1899, 1905 and 1906.

In value the corn crop of this year is much above the high-water mark of 1906. On the assumption that the crop will be sold by farmers at an average price not below the present one, its value is estimated to be \$1,350,000,000, or 26 per cent. above the average value of the previous five crops. Four crops before had exceeded one billion dollars in value.

The farm value of the corn crop of eight such years as 1907 would pay for duplicating every mile of steam railroads in the United States and pay for their costly terminals, rolling stock, and all property. In 13 years it would replace the present banking power of this country in banking capital, surplus, deposits and circulation, and in 17 years it would replace the banking power of the world.

HAY.

Apparently the hay crop this year is more valuable than the cotton crop. On account of the varieties and qualities of hay its average price is difficult to determine without reports from crop correspondents. The computed value of the 61,420,000 tons of the crop is \$660,000,000. The tonnage has been exceeded several times, but the value is \$65,000,000 above the highest previous value, that of 1906. Compared with the average of the preceding five years, the quantity of the hay crop of this year is 2½ per cent. higher and the value is 20 per cent. higher.

COTTON.

If the cotton crop of this year does not eventually occupy second place in value instead of hay in the final estimates of the Department, if seed be included, it certainly has third place, even without seed.

The farm value of the 1907 crop of cotton and its seed is estimated to be from \$650,000,000 to \$675,000,000. The commercial expectations are that the crop will be found to be the third one in size ever raised, and perceptibly larger than the average crop of the previous five years. Its farm value is probably a little below that of last year's crop. Otherwise it will be the most valuable cotton crop ever raised in this country and 7 per cent. above the average farm value of the crops of the previous five years.

The year was a trying one to cotton from planting time to nearly the end of the summer, but even under adverse conditions a crop has been produced that will be sufficient, with the surplus of last year, to meet the requirements of spinners until the next harvest. The fears of a cotton famine that followed the low production of this country in 1901 have not been justified, and in the meantime efforts to make European spinners partly independent of the Upland cotton of the South by aiding the growing of "colonial" cotton have not made themselves felt. Outside of the British East Indies, the production of cotton in the British colonies, possessions and protectorates was 7,553 bales of 500 lbs. gross weight in 1904 and 10,016 bales in 1905. In the French colonies, except French India and Indo-China, 400 bales were produced in 1904; in the German colonies, 1,500 bales in 1905.

Among the strong points of advantage possessed by this country's cotton is the low cost of transportation to market. Recent investigations by this Department indicate that the average cost of transporting cotton per 100 lbs. from farm to local shipping point is about 16 cents; from local shipping point to seaport, about 40 cents; and from seaport to the United Kingdom, about 32 cents; the total being only 88 cents per 100 lbs., or less than a cent a pound.

WHEAT.

Wheat, the fourth crop of the year in value, is deficient in quantity by 5 per cent. when compared with the average crop of the preceding five years. The 625,576,000 bushels produced will be enough for a large per capita consumption, with a remnant of many millions of bushels for export, although not as many as usual. During the last five years the wheat exports, including flour, have averaged 122,411,110 bushels, and during that period 18.6 per cent. of the crops was exported.

Although wheat is 5 per cent. in quantity below the average crop of five years preceding, it is 5½ per cent. above the average value of these crops, or a little over \$500,000,000. The crops of three years, 1901, 1902 and 1905, had a slightly higher value than this one.

OATS.

The only large crop to which a great degree of failure attaches this year is oats. Only 741,521,000 bushels were harvested and these were of low quality. In number of bushels this is the tenth oats crop ever grown in this country, and it is 19 per cent. below the average crop of the previous five years.

In value the story is different. Contrasted with the loss of 19 per cent. in quantity is a gain of 26 per cent. in value in comparison with the five-year average; so that this year's crop is worth \$360,000,000, or much more than the most valuable oats crop heretofore produced.

POTATOES.

The sixth crop in value is potatoes—292,427,000 bushels, worth \$190,000,000. Three potato crops have exceeded this one in size—those of 1895, 1904 and 1906—but it is 2 per cent. above the average of the previous five years. Its value is 26 per cent. above the five-year average.

BARLEY.

Barley has pushed its way upward in production until it is now the seventh crop in value. The 147,192,000 bushels of this year are estimated to be worth \$115,000,000. Only the crop of 1906 was larger, and the crop of 1907 is 2 per cent. above the average of the previous five years. The value of barley this year indicates an extraordinary situation, the price per bushel being about double what it was last year; hence the value of the crop is about 85 per cent. above the average of the previous five years.

TOBACCO.

The tobacco crop has declined to 645,213,000 lbs. this year and is smaller than the crops of many years. It is 11 per cent. under the average of the preceding five years, yet the value is the highest ever reached, except in 1906, and is estimated to be \$67,000,000, or 16 per cent. above the five-year average.

SUGAR, MOLASSES AND SIRUP.

As farm crops, sugar beets and sugar cane are valued herein as such, except that the cane products are taken into account if the cane is crushed on the farm. The large cane-sugar mill is classed with manufacturing instead of with agriculture; this is to preserve the census basis for comparison.

The farm value of the sugar beets in 1907 and of the sugar cane and sorghum cane and such molasses and sirup as were made on the farm is estimated to be \$64,000,000. The sugar-beets value is slightly above the figure for 1906, and is 50 per cent. above that for 1905, and twice the amount for either 1903 or 1904. The farm value of sugar cane, molasses and sirup is estimated to be \$33,500,000, which was exceeded only in 1904.

The popular interest in this subject is so large that it is worth mentioning as a manufacturing industry. The raw cane-sugar mill production of 1907 is estimated at 389,000 short tons, with a factory value of \$28,000,000, the year 1904 alone exceeding this amount. The estimate for refined beet sugar is 500,000 short tons, worth \$45,000,000.

Both kinds of sugar add to 889,000 short tons, worth \$73,000,000. When mill molasses and sirup and sorghum and maple products and beet pulp are added, the total value of the ultimate products of the sugar, molasses and sirup industry (the refining of cane sugar not included) in 1907 is \$95,000,000.

FLAXSEED.

The 25,420,000 bushels of flaxseed of this year's crop are worth about \$26,000,000, the quantity being 5 per cent. under and the value 3 per cent. over the average of the previous five years. The crop of 1902 is the only one that exceeded this one in value.

RYE.

With a production of 31,566,000 bushels, or 4 per cent. above the average of the five previous years, the rye crop has a value of \$23,000,000, or 29 per cent. above the five-year average. In three years, going back to 1891, the production has been greater, and the value has been higher in two years, 1867 and 1901.

RICE.

Rice is the twelfth crop in point of value this year and in both quantity and value is the record rice crop. The preliminary estimate is a production of 21,412,000 bushels of rough rice, or 963,540,000 lbs., an amount a little above the great crop of 1904 and 98 per cent. above the average crop of the previous three years. This year's crop is worth \$19,500,000 to the farmers, or 36 per cent. above the three-year average.

The exports of domestic rice in the fiscal year following the crop year 1904 were 75,000,000 lbs. of cleaned rice, 4,000,000 lbs. in 1906, and 2,443,000 lbs. in 1907. The imports of rice, less the foreign and domestic exports, were about 64,000,000 lbs. yearly from 1900 to 1903, and about 62,000,000 lbs. in 1904. After the crop of 1904 the tide turned and in 1905 there were net exports amounting to 41,000,000 lbs., followed the next year by net imports of 43,000,000 lbs., and in 1907 of 61,000,000 lbs. The only year before 1907 when the production was greater than the consumption was 1904, and the production in 1907 is greater than in that year. The Department of Agriculture has been helping the rice grower to get better varieties from the Orient, which has changed imports into exports.

BUCKWHEAT.

Buckwheat was a crop of larger production before 1860 than it has been in subsequent years, but it has revived during the last half dozen years. The production in 1907 is 13,911,000 bushels, or 4.7 per cent. below the average of the previous five years, and its value is \$10,000,000, or 14 per cent. above the five-year average.

HOPS.

The hop crop has lapsed somewhat from its position in 1905 and 1906. The production of 1907 is estimated at 48,330,000 lbs., or 4.6 per cent. below the five-year average, while the value of the 1907 crop is placed at a little less than \$5,000,000, or 29 per cent. below the five-year average.

TOTAL OF CEREALS.

Upon consolidating the seven cereal crops and comparing the production of 1907 with the average of the preceding five years, a loss of 214,000,000 bushels is observed, or 5 per cent. That is, the average of the five years was 4,349,000,000 bushels, and the production in 1907 was 4,135,000,000 bushels. The oats crop was 175,000,000 bushels under the average, and wheat 32,000,000 bushels, while rice was 11,000,000 bushels above, and rye and barley a little above.

Regarding corn as at the average of production and excepting oats, the other cereals show a net reduction below the five-year average of only 18,000,000 bushels, and this in a total production, omitting oats, of 3,393,000,000 bushels, so that the percentage of the net reduction is only one-half of 1 per cent.

In total value the seven cereal crops make a new high record that is above that of 1906 by \$296,000,000. The farm value of the cereals of this year is estimated to be \$2,378,000,000, or 23 per cent. above the average of the previous five years.

SUMMARY OF CROPS.

In the production of crops the year 1907 has been a good one to all of the people as well as to the farmers. It has averaged with the previous five years after a general balancing of gains and losses. A great fall in oats below the average and much smaller declines in wheat, tobacco, hops, flaxseed and buckwheat have been counter-balanced, and more than that, by increases above the average in cotton, hay, barley, rye, rice and potatoes. This means material commodities and not the value placed upon them.

No such high aggregate of crop values has ever before been reached by farmers as for the crops of 1907. In estimating these, little if any use is made of the high prices before the break in the latter part of October. The present indication is that every crop except hops will considerably, if not very much, exceed in value the average of the previous five years. Extremely large rates of gain are observed for corn, oats, barley, rye, hay, tobacco, potatoes, rice and cotton seed, and the rates of gain would be notable in any ordinary year in the case of wheat, cotton lint and buckwheat.

In the grand total income from his crops of this year the farmer finds himself in better financial condition than before. He reckons his income in ten figures and he is still improving his farm, buying bonds, lending to his neighbors, and putting his money into the vaults of banks.

Wealth production on farms in 1907, as expressed in value, transcended the high record of 1906, which was itself much above the highest amount before reached. In arriving at the total the farm products of the year are estimated in value for every detail presented by the census and at that point in production at which they acquire commercial value.

The grand total for 1907 is \$7,412,000,000. This is \$657,000,000 above the value of 1906, \$1,103,000,000 above that of 1905, \$1,253,000,000 above that of 1904, \$1,495,000,000 above that of 1903, and \$2,695,000,000 above the census amount for 1899.

The value of the farm products of 1907 was 10 per cent. greater than that of 1906, 17 per cent. over 1905, 20 per cent. over 1904, 25 per cent. over 1903, and 57 per cent. over 1899.

A simple series of index numbers shows the progressive movement of wealth production by the farmer. The value of the products in 1899 being taken at 100, the value for 1903 stands at 125, for 1904 at 131, for 1905 at 134, for 1906 at 143, and for 1907 at 157.

During the last nine years wealth estimated as above explained was created on farms to the fabulous amount of \$53,000,000,000.

EXPORTS.

Food and fiber were provided in such enormous quantities in 1906 that a great national surplus went abroad to feed and clothe many millions in foreign countries. High prices helped to swell these exports as expressed in money, and for the first time in the history of the world a country exported agricultural commodities of home production to a value greater than \$1,000,000,000.

In the year ending June 30, 1907, the domestic exports of farm products were valued at \$1,055,000,000, or \$79,000,000 above the high record of the previous year. Four-fifths of these were plant products, and chief among these was cotton, with a port value of \$482,000,000, an amount much above the highest value of any former year.

The exported grain and grain products were valued at \$184,000,000, the unmanufactured tobacco at \$33,000,000, the oil cake and oil-cake meal at \$26,000,000, the vegetable oils at \$20,000,000, and the fruits at \$17,000,000. All were gains over 1906, except the item of grain and grain products.

Animals and animal products were exported to the value of \$255,000,000, mostly composed of packing-house products, worth \$203,000,000, or only \$4,000,000 under the high-water mark of 1906. Exported live animals were valued at \$41,000,000 and dairy products at \$6,600,000.

IMPORTS.

Agricultural products valued at \$627,000,000 were imported in the fiscal year 1907, of which the plant products were \$403,000,000, chief among these being sugar and molasses, valued at \$94,000,000; coffee, \$78,000,000; vegetable fibers, \$62,000,000; fruits and tobacco,

each valued at \$26,000,000, and vegetable oils, with a value of \$15,000,000.

Animals and their products were imported to the value of \$224,000,000, with packing-house products, mostly hides and skins, valued at \$96,000,000; silk valued at \$71,000,000, wool at \$42,000,000, and dairy products at \$6,000,000.

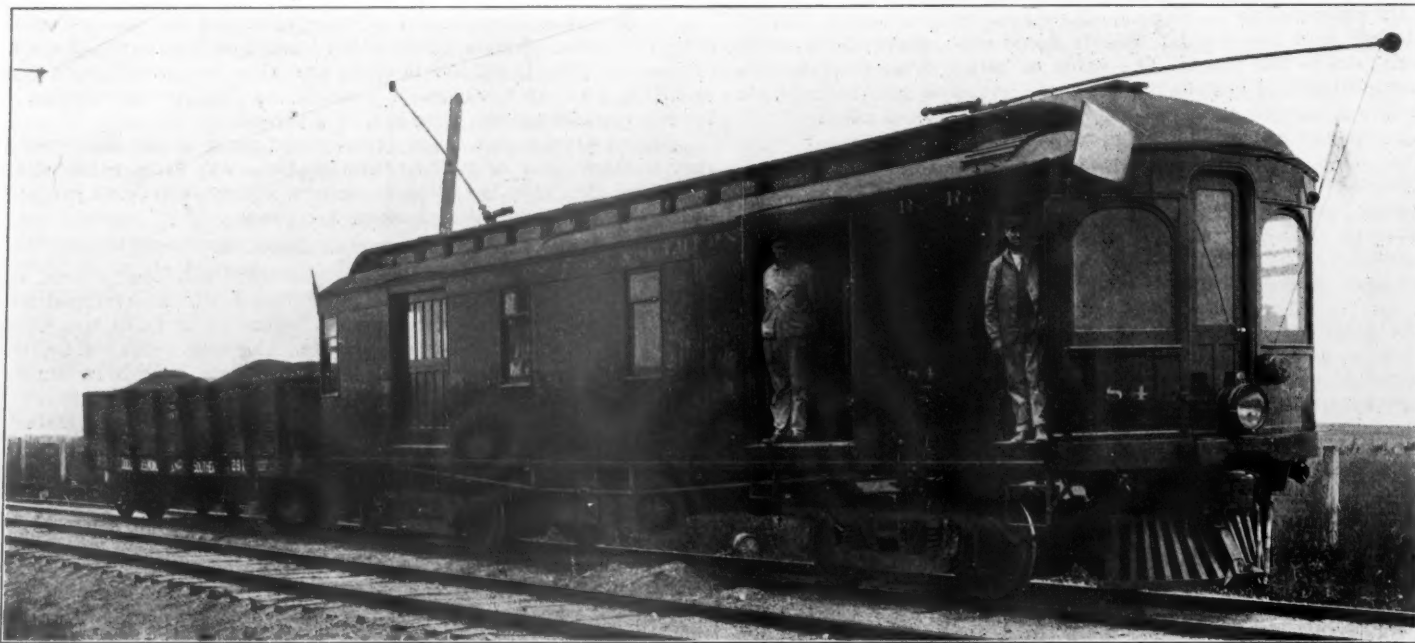
FOREST PRODUCTS.

Never before 1907 were the year's exports of forest products so

valued at \$26,000,000 above the total of 1906, which was the highest amount hitherto reached.

The Fort Dodge, Des Moines & Southern Railway.

During November a new electric road operated by overhead trolley was put in operation from Fort Dodge, Iowa, south to Des Moines, 92 miles. This is the Fort Dodge, Des Moines & Southern,



Local Freight Train; Ft. Dodge, Des Moines & Southern.



Wood Trestle and Bridge at Crossing of Des Moines River near Fraser, Iowa.

valuable as in this year. With an increase of \$16,000,000 over 1906, the total of these exports ran up to \$93,000,000, of which \$52,000,000 was the value of lumber, \$22,000,000 naval stores, and \$18,000,000 timber.

On the other hand, the imported forest products were valued at \$123,000,000, mostly composed of india rubber, valued at \$59,000,000; lumber, valued at \$21,000,000; gums, not including rubber, valued at \$15,000,000; wood pulp at \$6,000,000, and unsawed cabinet woods at \$5,000,000. The total imports of forest products were

which includes part of the Newton & Northwestern, a steam road from Rockwell City, Iowa, south through Boone to Newton, 101 miles; and two new pieces of road, one south from Fort Dodge, the other north from Des Moines. Forty-two miles of the Newton & Northwestern lying almost in a direct line between Fort Dodge and Des Moines were electrified, and two extensions of 25 miles each were built, one from Lanyon, at the northern end of the electrified section of the steam road, the other from Huxley, at the southern end, thus establishing the through line between the two cities.

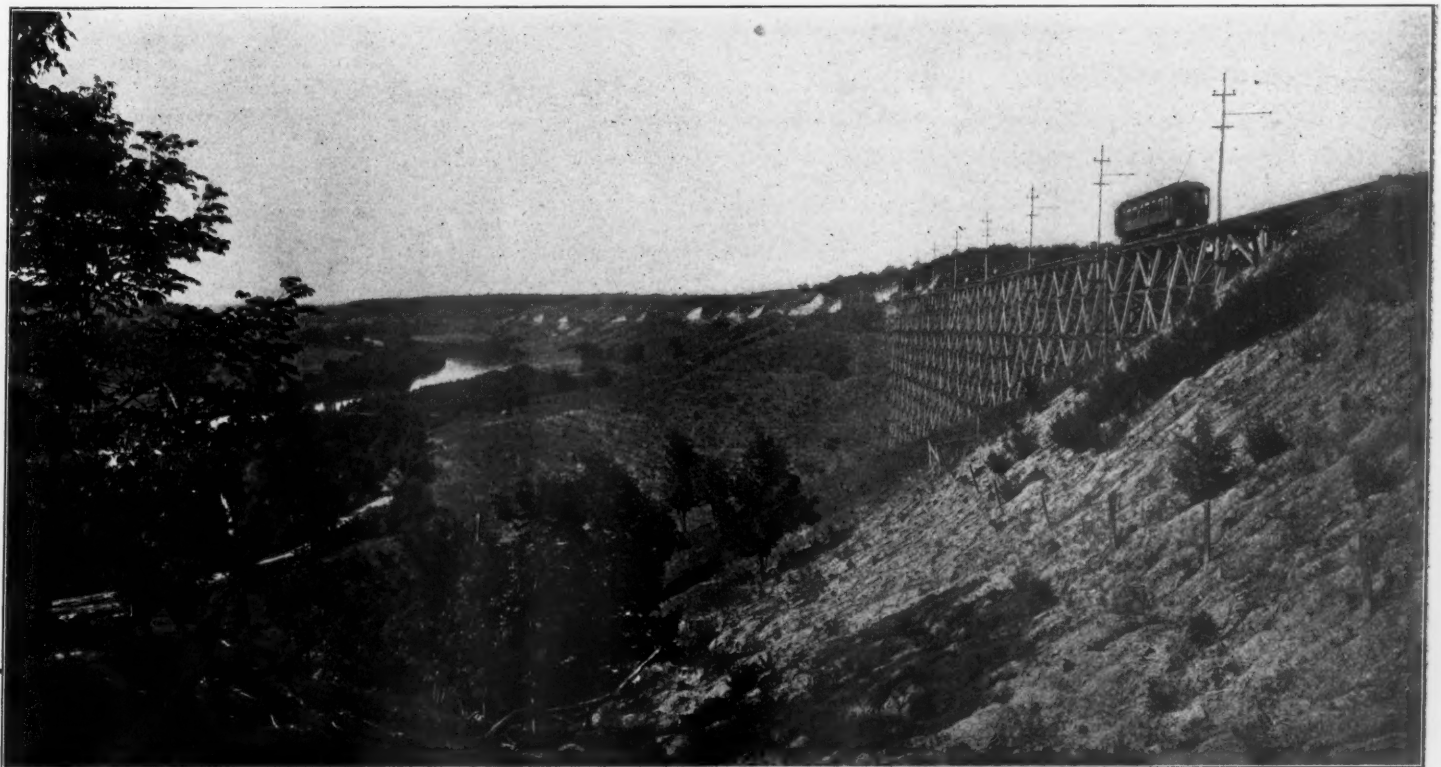
This section of Iowa is well supplied with railroads, but they are mostly east and west lines. The new road is crossed by the Chicago Great Western and the Illinois Central at Fort Dodge, the Chicago & North-Western at Boone, and the Chicago, Rock Island & Pacific at Des Moines. These three cities are active business and railroad centers, and there has been need of direct railroad connection between them. There has been no direct railroad connection between either Fort Dodge and Boone, or Des Moines and Boone, while other important points such as Ames have not been easily accessible. The Fort Dodge, Des Moines & Southern now makes a through line connecting all these points. Besides the direct local traffic

city limits consumes 43 minutes of the total running time. The 42 miles between Huxley and Lanyon, the electrified section of the Newton & Northwestern, is covered by all the electric trains in 1 hour and 36 minutes, including seven regular stops. This stretch was generally covered by the steam trains in about two hours.

The electrified section of the steam road was improved for this service, and the extensions are gravel ballasted and equipped with 70-lb. rails. The country is fairly level except near Boone, where the road crosses the Des Moines river. Here the country is rugged. Deep ravines lying at right angles to the river abound. On this part of the line is the maximum grade, $2\frac{1}{2}$ per cent. To get even this



Car Barns at Boone; Fort Dodge, Des Moines & Southern.



High Trestle near Des Moines River West of Boone; Fort Dodge, Des Moines & Southern.

between these three cities, it should get considerable traffic as a distributor of the through traffic of the trunk lines which it crosses. Already joint passenger traffic arrangements have been made with the Illinois Central and the Chicago Great Western at Fort Dodge. The Fort Dodge, Des Moines & Southern will also carry express and freight.

The passenger train service now established between Fort Dodge and Des Moines is based on an average speed of $27\frac{1}{2}$ miles an hour, including 15 regular stops. A maximum speed of 55 miles an hour is frequently made between stations. From terminal to terminal the total running time is 3 hours and 50 minutes, but $61\frac{1}{2}$ miles within

grade it was necessary to build a succession of trestles over the ravines along the edge of the plateau above the river. One of these trestles, shown herewith, is one of the longest and highest in the country.

In traffic and operating methods the road uses steam railroad practice wherever possible. There are ticket, baggage, express and freight offices at all regular stations. One-way passenger fares are sold at about 2 cents a mile, while a rate of about $1\frac{1}{4}$ cents a mile is made for round-trip tickets. Five-hundred-mile mileage books cost \$7.50.

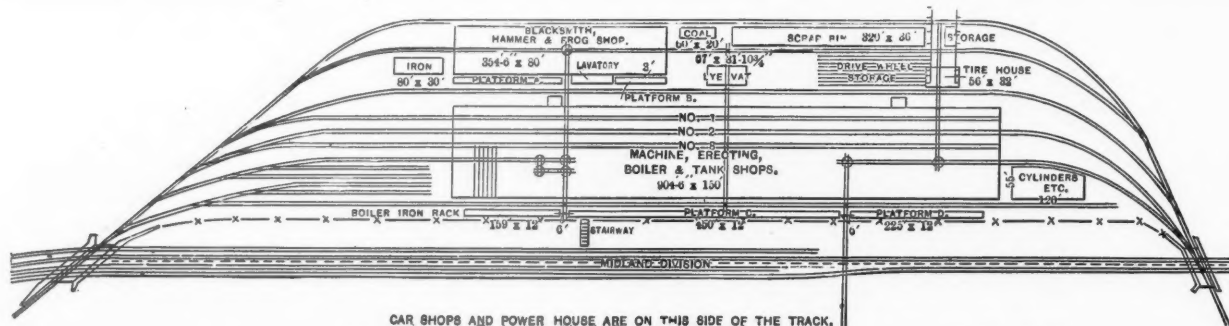
The cars are shown in the photographs. They are of the best

interurban standard. Passenger and express cars are similar, each having four 75-h.p. Westinghouse motors and equipments. They are 53 ft. long over buffers and 9 ft. 6 in. wide over sills, which is nearly as wide as a standard steam railroad coach. They are single ended and have locomotive pilots, standard radial drawbars and also M. C. B. couplers. Westinghouse multiple unit control apparatus is used on all cars for operation in trains. Passenger cars are finished inside in mahogany with semi-Empire ceilings and plate glass windows. The seats are upholstered in leather. At one end of each passenger car is a smoking compartment containing eight seats and also a baggage compartment fitted with movable seats. When the seats are filled, the passenger cars weigh about 76,000 lbs.

A turbo-electric plant at Frazer, which is midway between the

Readville Locomotive Shops; New York, New Haven & Hartford.

When it became necessary for the New York, New Haven & Hartford Railroad to increase its locomotive shop facilities, it was decided that the most suitable location for new shops would be at Readville, Mass., where the main car repair shops of the company were. Such an arrangement would concentrate the repair work, and Readville was in other ways a good location by reason of its being at the junction of two main divisions of the road. Additional property was bought south of the tracks of the Midland division, and the locomotive and car departments united by subways at the east and west ends of the grounds where main line trains pass under the Midland division; also by a subway about



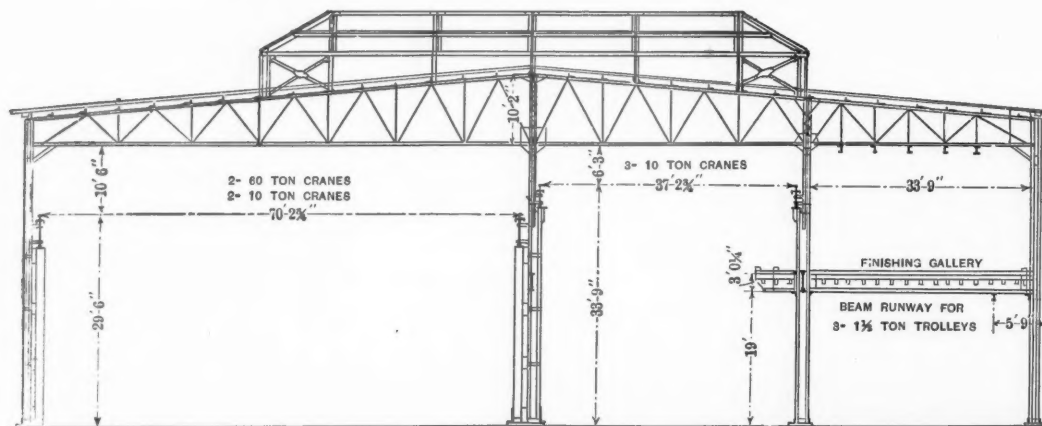
General Plan of Locomotive Repair Shops at Readville, Mass.; N. Y., N. H. & H.

terminals and on the Des Moines river, supplies the power. Near Frazer slack coal is mined and is a cheap fuel. The power is generated as alternating current and transmitted at 20,000 volts to five sub-stations which are an average distance of about 15 miles apart. At the sub-stations the alternating current is transformed to direct current at 600 volts, which is supplied directly to the trolley wire. All the principal electrical apparatus is of Westinghouse manufacture.

The engineering and electrical construction and equipment of the system were carried out by J. G. White & Co., of New York City. The grading and track work was done by the Northwestern

the middle of the grounds for pushcar service and foot passengers, and by conveniently located stairways over the Midland division fill. One main entrance serves both departments and the yard tracks of each are connected. One shop superintendent has charge of both departments with a general foreman for each department; the plants are therefore substantially a unit.

The car shops have been in operation for several years; the locomotive shops have only recently been put in operation. The principal building of the new shop plan is 904 ft. 6 in. x 150 ft., which includes the machine and erecting, boiler and tank shops. The long axis of this building is parallel to the tracks of the Midland division and the building and yard tracks are connected with the main line of the Providence division at the eastern end. By means of a crossover from the Providence division to the Midland division access to the shops from either division is obtained. Other buildings are a blacksmith and frog shop 354 ft. 6 in. x 80 ft., an iron shed 80 ft. x 39 ft. adjoining, a tire house 56 ft. x 32 ft., a lye house 67 ft. x 31 ft. 10 in., and a coal house 60 ft. x 20 ft. In the yard are numerous storage platforms; one 12 ft. wide extending the length of the main building and terminating at the boiler shop end of the building in a boiler iron rack 159 ft. x 12 ft.;



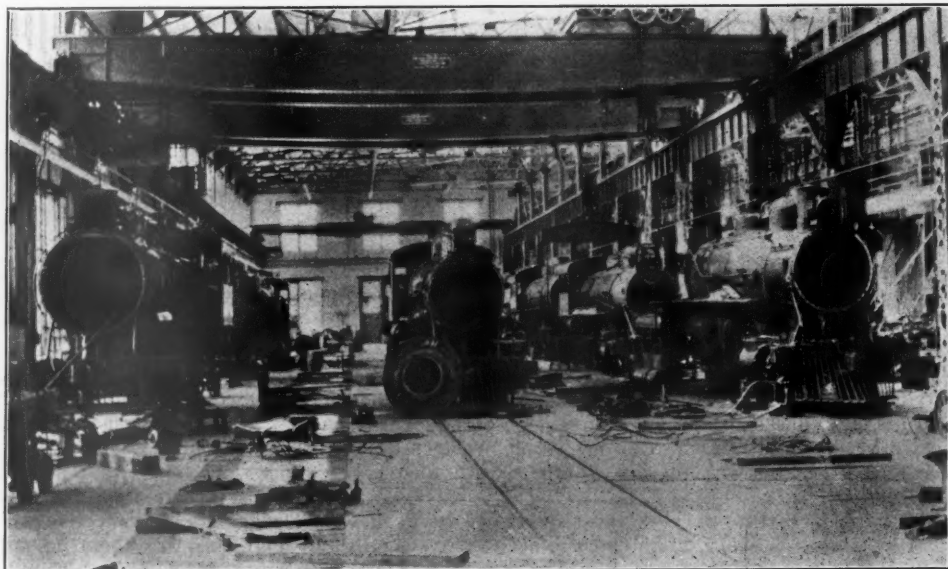
Cross-Section Through Erecting and Machine Shop.

Construction Company. J. L. Blake, General Manager of the Fort Dodge, Des Moines & Southern, representing the owners, had general supervision of the undertaking.

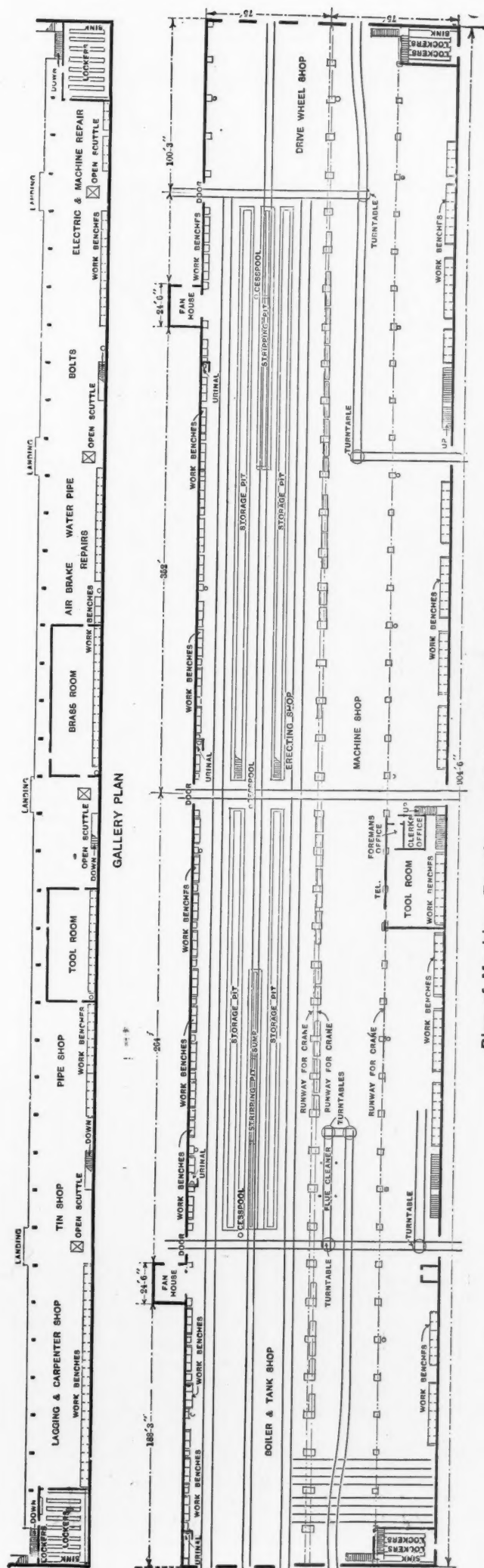
Foreign Railroad Notes.

The Prussian State Railroads have concluded a contract with the German steel combine for their supply of rails and steel ties for the next three years at 120 marks for rails and 111 marks for ties per kilometeric ton = \$29.02 and \$26.84 per ton of 2,240 lbs.

In an address before the German Society of Mechanical Engineers recently, Herr Wichert, an eminent electrical expert, who, with others, had recently returned from a mission to America, to study the application of electricity to transportation, declared that a satisfactory solution of the question of the use of electricity on ordinary railroads has been found only by the invention of the single-phase, alternating-current collector motor.



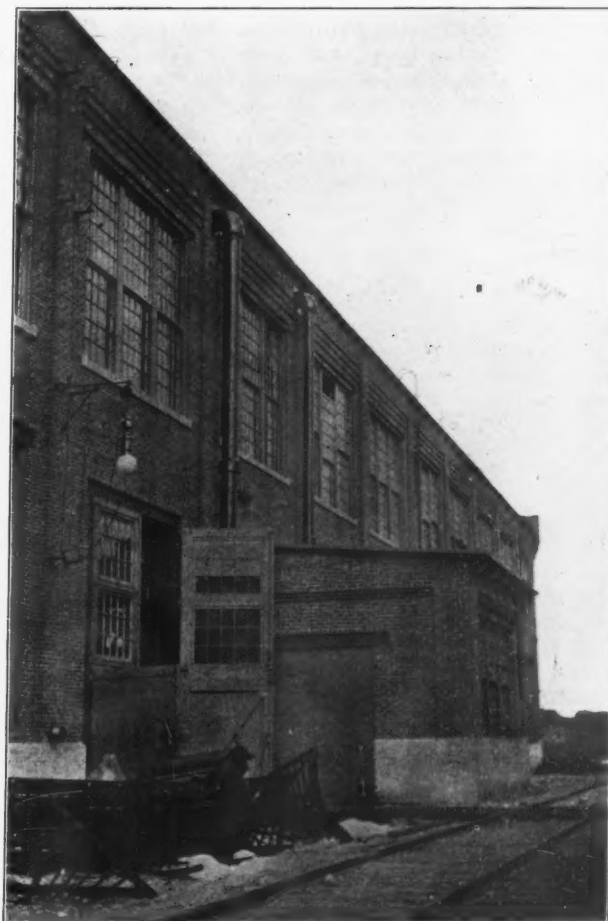
Interior of Erecting Shop; Readville Shops.



Plan of Machine, Erecting and Boiler Shop; Readville Shops.

a platform for cylinders at the opposite end of the building 120 ft. x 55 ft. at its greatest width; a scrap platform 320 ft. x 36 ft. provided with bins for assorted material. Three tracks entering from the east pass entirely through the main building; three others are carried through and along each side of the blacksmith shop and alongside the scrap bins, while another passes between the long platform previously mentioned and the north side of the main building. Adjacent to the tire house is a yard for driving wheel storage.

Locomotive Shop.—A number of features in the design, construction and equipment of the main building are of interest and particular attention has been given to details. The materials are steel, brick and concrete with mill construction and roof covered with five-ply asphalt and gravel. The concrete foundations are carried to a height of 5 ft. from grade, and the sills of the first floor windows are formed directly in this material, no stone sills being used. The concrete floors in the machine shop are laid in squares, although the method of laying is not apparent in the finished floor, the outline of the blocks being formed of a strip of tar paper rising to within $\frac{1}{2}$ in. of the surface and folded underneath the lower edge of the block. All the steel work was fabricated and



Part Exterior of Main Building.

erected by the New England Structural Steel Company, Boston and Everett, Mass.

The shop was designed to afford facilities for repairing 45 locomotives a month. The erecting shop floor occupies half of the width of the building for about two-thirds of its length, a space approximately 200 ft. long at one end being used for a boiler shop and 100 ft. at the other being used for a driving wheel shop. Stripping pits each 150 ft. long are located at each end of the stripping track, which is the center track of the erecting floor. The stripping pits are flanked on each side by storage pits which extend the whole length of the erecting floor, or about 600 ft., with the exception of a 20-ft. passageway in the middle of the length of the buildings are a blacksmith and frog shop 354 ft. 6 in. x 80 ft., in the engravings. The storage pits are 6 ft. wide, built entirely of concrete with walls 12 in. thick supported on foundations 18 in. wide and 12 in. deep of the same material. At the ends these pits are 2 ft. 10 in. deep and the floors drain longitudinally on a slope 2 in. in 30 ft. to the maximum depth of 3 ft. in the center. The pits are covered with loose 4-in. x 12-in. yellow pine plank and every tenth plank is provided with a pair of heavy malleable iron handles set flush with the surface.

The walls of the stripping pits are of concrete 15 in. thick on foundations 12 in. x 14 in. The walls are capped by 8-in. x 12-in. yellow pine stringers secured by $\frac{3}{4}$ -in. anchor bolts spaced every

this feature introduces further flexibility as the section may be divided in the center and half the load distributed to each motor on either side of the one in trouble.

The Sturtevant hot-air system is installed for heating and ventilating the main building. Two fans are located in lean-to extensions on the ground and two more are located on the gallery. The fans are spaced so as to divide the periphery of the building into four equal parts. The main artery of the system is a concrete duct built entirely around the building under the floor in the shop near the outer walls, varying in width from 4 ft. to 2 ft. 6 in.

are secured to an I-beam reinforcement embedded in the concrete cover of the duct. A gravity return from the heating system drains to a receiving tank under the floor of the machine shop and the water of condensation is forced back by a pump to the boiler room. In the boiler shop end of the building is a high-pressure pump capable of pumping up to 300 lbs. pressure, and connected with this is a line of extra heavy piping along the center and side columns for use in testing boilers.

The tool room on the gallery is a manufacturing tool room only, and the corresponding room on the ground floor is for issue, dressing and grinding tools. A central station for a complete shop telephone system of 31 extensions is located in the distributing tool room. The installation of the telephone system with switchboard in the tool room and stations at numerous points saves the time required for mechanics to go to the tool room for tools. When any special tool is required the mechanic calls for it by telephone and the tool is sent by messenger, who takes a check for it.

All tool-dressing is done in the tool room and not in the blacksmith shop, a suitable forge and power hammer being provided for the purpose. Cast-iron boxes in the floor between the tracks of the erecting shop are provided for the attachment of hose to the air-pipe system and a large number of portable lathes, forges and rivet furnaces as well as electric drills are in daily use on the erecting floor and in the boiler and tank shops. Twenty portable forges were recently supplied by the W. N. Best American Calorific Company, New York, to these shops.

Good provision has been made for natural lighting in the new shop building. The windows are large and set close together.

Each bay of 22 ft. between pilasters contains two sets of triple sash, the second floor windows being 15 ft. 8 in. x 13 ft. 1½ in. (three sections of 50 10-in. x 14-in. panes). The lower windows are 15 ft. 8 in. x 17 ft. 8 in. and consist of three pairs of sash each containing 60 10-in. x 14-in. panes. Over each alternate bay in the roof is a skylight of ribbed glass and the lighting is further improved by the white paint of the interior.

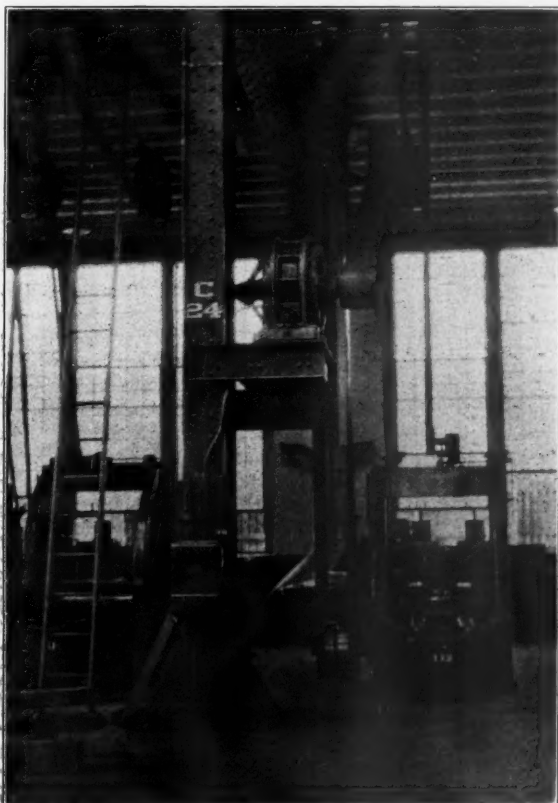
Artificial lighting in high bays, over erecting floor and in the yard is by series arc lamps with Nernst four and six blower lamps for general illumination over and under the gallery and along the central row of columns. On the outside walls over the benches Faries articulated fixtures with incandescent lamps are used and each machine tool is provided with an incandescent lamp. A plentiful supply of Chapman light sockets is provided, along the center line of columns, outer walls and in the pits.

Tire House.—A useful adjunct to the locomotive shop is the

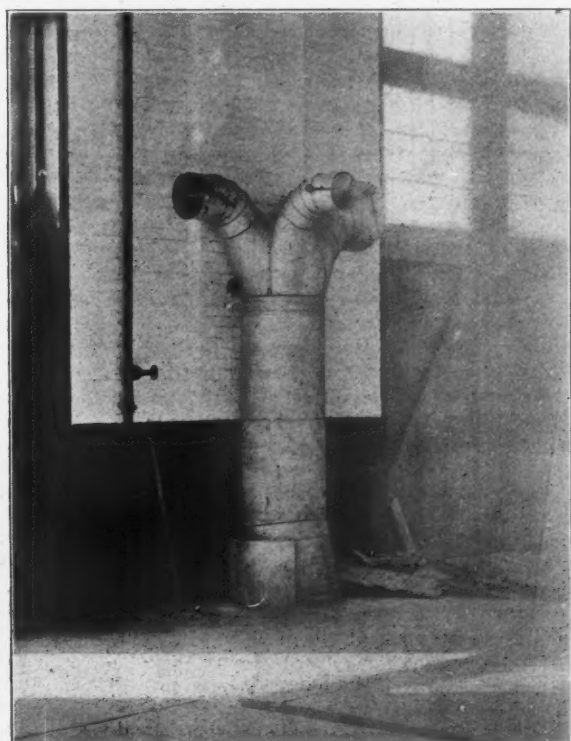


Interior of Blacksmith Shop at Night, Showing Illumination.

and ordinarily 3 ft. high except where some obstruction made necessary a change in section. Ten manholes afford access to the interior. The underground duct obviates the use of unsightly overhead pipes, and the only parts of the system that appear are the galvanized iron risers next to the outside wall. A novel plan was adopted for making the connections between the duct and the risers. Space was too limited to use the ordinary vitrified elbow, and as a substitute an elbow of No. 20 galvanized iron was used as a form and around this was built a shell of concrete of not less than 2 in. thickness. This elbow was made to project 2 in. above the floor level and on this projection the riser was fitted, the joint then being sealed with a collar of cement. At points where the duct is crossed by the tracks entering the erecting shop the rails



Motor Bracket on Intermediate Column.

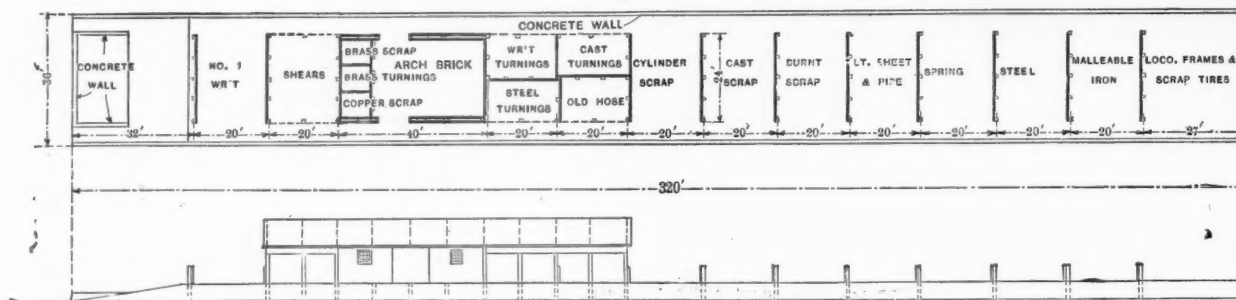


Riser from Heating Duct.

tire house with its adjacent yard for the storage of mounted driving wheels. This is located next to the section of the main building in which the driving wheel work is done and is a fireproof building of corrugated steel. It is equipped with a 10-ton traveling crane which operates within and outside of the building over the tracks in the yard. It contains also a Ferguson oil furnace supplied by the Railway Materials Company, Chicago, and of a sufficient capacity to heat a nest of eight tires at one time. For the removing tires on a pair of mounted wheels the crane supports them in the ordinary fire on the floor until sufficiently heated.

The lye cleaning house is a separate structure. There are two lye vats and two draining platforms. The vats are 18 ft. 8 in. by 10 ft., inside dimensions, and the least depth is 7 ft., the bottom sloping 4 in. in 20 ft. Each pit has a concrete platform having a similar slope and covered with a grating of 3-in. x 6-in. yellow pine strips spaced 2 in. apart on a frame of 4-in. x 4-in. spruce joists. The floor not occupied by pits and platform is of macadam. The walls of the pits are 18 in. thick and the floor is 9 in. thick, of concrete. The walls of the pits were waterproofed with soft soap and alum solution. It has been found, however, that the oil from the greasy parts which were dipped into the lye has been absorbed by the walls to such an extent as to increase the waterproofing. The usual steel tank inside of the lye pits has therefore been omitted. The space afforded by the tanks, cleaning and draining floors is ample and the usual litter around this department is not in evidence. The service track passes through the middle of the house between the two sets of pits and platforms.

Blacksmith and Frog Shop.—The blacksmith shop, one end of which is fitted up as a frog shop, is unusually light and fully equipped with ventilating apparatus. The tool equipment includes McCaslin forges, Ferguson furnaces, etc., and an extension, 68 ft. 6 in. long x 15 ft. 4 in. wide, is devoted to locker and toilet rooms.



Plan and Elevation of Scrap Storehouse and Platform; Readville Shops.

The monitor roof is provided with swinging sash and louvres. All sash is pivoted and arranged to operate from the floor. Service tracks extend through the middle of the building longitudinally and transversely.

Platforms.—Reference has been made to the platform space in the yard and the dimensions of the principal ones have been given. These are all built with concrete walls and floors with a gravel filling. The arrangement and construction of the scrap platform is shown in the illustrations. The covered scrap bins occupy 100 ft. of the length. The roof of this part is three-ply Paroid roofing and the doors are hung on Coburn trolley hangers. The open space is divided into spaces 20 ft. wide for the various classes of scrap.

The yard also contains a fuel oil storage tank in the form of a depressed covered pit containing steel tanks into which the oil is taken by gravity. Oil is drawn from the tank by means of a pump provided with a pressure regulator and the oil is distributed at a fixed pressure to all parts of the shops and is shut off automatically at a fixed pressure. The system is so arranged that at night or when the furnaces are not in operation all oil in the pipes returns by gravity to the tank.

Adjacent to the blacksmith shop is the iron shed provided with the usual rack space and room for weighing and cutting at the ends. The coal shed has a concrete floor throughout and is divided into spaces for coke, charcoal and coking coal.

Power House.—The power house is on the car shop side of the plant, and originally was a sub-station taking current from a power station belonging to the railroad company at Hyde Park, one mile away. The boiler plant which was added consists of five 400 h.p. Babcock & Wilcox boilers, four of which are equipped with Roney stokers, one being reserved for burning shavings, etc. They are provided with Sturtevant economizers and operate under induced draft. The original chimney still remains, however, and provision has been made by which the economizers can be bypassed and induced draft used or both by-passed and natural draft used. The equipment includes Hancock injectors and Warren-Webster feed water heaters, open type. There are two Worthington duplex outside center-packed plunger feed-water pumps, each having a sufficient capacity to supply water for the entire plant. In process of installation is a coal handling system with a clam-

shell bucket working on a single I-beam trolley. This is supplied by the Whiting Foundry & Equipment Company, Harvey, Ill. This will handle coal from the storage to the stokers and will also be used for the removal of ashes, the apparatus being electrically operated.

In the engine room are three 400 k.w. G. E. a.c. generators, 25 cycles, 600 volts, direct-connected to three 600 h.p. cross-compound non-condensing Hamilton-Corliss engines equipped with Locke safety stops; two G. E. exciters direct-connected to 90-h.p. Watertown engines; one Franklin cross-compound air compressor having a capacity of 1,700 cu. ft. of free air per minute, supplied by the Chicago Pneumatic Tool Company; two Franklin compressors of 1,100 cu. ft. capacity each; three Brush dynamos for series arc lighting.

The switchboard is equipped with a Tirrell voltage regulator, station watt-meter and separate lighting watt-meter together with a full complement of volt-meters, ammeters, switches, etc. The car-shop transfer table was formerly operated with a direct-current motor, but this and the motor generator set have been removed and an induction motor installed. In the process of remodeling the power-house equipment for present purposes all 60-cycle transformers for lighting were removed and 25-cycle transformers installed. As a result of these changes all electric apparatus on both the locomotive and car-shop side now operates on three-phase, 25-cycle alternating-current, power voltage being 550; Nernst lamps 220 volts, incandescent lamps 110 volts.

All steam pipes between buildings are encased in Wyckoff sectional covering and are carried underground. As an interesting detail may be mentioned the color scheme in the various piping systems in the locomotive shop. The colors and their significance are as follows: White, high-pressure steam; yellow, exhaust and low-pressure steam heat; black, water, including boiler feed and

feed water heater; green, air; blue, drip and return, including the Holley system; red, fire service.

All wiring, switchboard and pipe work and the installation of the Holley system were done by Westinghouse, Church, Kerr & Co., H. C. Pond, engineer in charge, under the direction of the railroad company. All wiring is overhead and is carried across the Midland division in tile conduits built into the concrete arch, affording access from one side to the other.

E. H. McHenry, Vice-President, has had general supervision of the design and erection, and F. K. Irwin, Constructing Engineer, was in charge under Mr. McHenry. S. Higgins, General Manager, and the mechanical superintendent assisted in the consultation with reference to the general scheme and in the selection and arrangement of machinery. C. A. Dodge & Co., Boston, were general contractors, and Babcock & Wilcox had the contract for the boiler room, including all apparatus except the coal-handling plant.

The Japanese Railroad Commission reports that there were in the country March 31, 1907, 4,783 miles of railroad, of which 1,532 miles belonged to the state. During the year previous 89 miles were added to the system, and at the end of the year work was progressing on 821 miles more. The average cost per mile of the completed roads has been \$43,056. The train service was at the average rate of 10.4 each way daily, and the average number of cars per train was 15.8. The traffic amounted to 2,505 millions of passenger miles and 1,352 millions of ton-miles, which is at the rate of 717 passengers and 387 tons each way daily. (In this country 154 passengers and 1,318 tons.) Thus there is 4½ times as much passenger traffic per mile in Japan, but not one-third as much freight traffic as here. The gross earnings per mile in Japan were \$7,309; the working expenses, \$3,404, and the net earnings, \$3,905. Here the contrast with the results in this country are striking. Our railroads earned per mile \$3,151 more gross, but \$357 less net, owing to the fact that working expenses were \$6,912 per mile here against \$3,404 in Japan. The Japanese net earnings were 9 per cent. on the cost of the roads. The number of employees was 73,754, which is nearly 15½ per mile against 6.9 here.

Retirement of James F. Jackson.

On Nov. 30, James F. Jackson retired from the chairmanship of the Massachusetts Railroad Commission, in order to be able to devote more time to his private business. In these days of radical and half-baked action by the state commissions, it is pleasant to turn to the intelligent and efficient work which has been done in Massachusetts, and the retiring chairman of the board of commissioners has been a worthy successor to Charles Francis Adams, Jr., in his own policies as well as in his efforts to carry out the long-established principles of the commission since its earliest days. The Massachusetts commission is endowed with full police powers; in other matters it works with publicity and suggestion as its tools, and its opinions and decisions, carefully made, carry with them such weight of public opinion that they have nearly the force of statute, and can usually command new legislation.

We take the following comment on Mr. Jackson's administration from a careful review published in the *Springfield Republican*:

Those who have watched the administration of Chairman Jackson realize what his decision to resume the practice of law means to the state. It has been evident in watching his conduct of hearings and in reading the orders and other decisions of the board, that he has aimed to be absolutely impartial between the corporations and the public. He has laid down certain principles and tried to supervise the roads—both steam and electric—in accord with them. During his administration many new deliverances have been made and these few years have been of large value to the people. Quite a development of railroad and railway law has occurred. Not only has the commission laid down principles of action, but it has had a share in the passage of legislation. It has continued to keep Massachusetts at the head of the development in the relation of the public to their transportation servants and its reports are in wide demand all over the country, and in foreign countries on the part of governments and of individuals.

Chairman Jackson has been particularly careful and painstaking in the drafting of the orders and other decisions of the board. His writings have struck out new lines of practice and they have been followed with precision. He has the remarkable fact to his credit that not a single decision which he has made, not a single principle of administration which he has formulated, during his whole eight years in the chairmanship, has been set aside by any court. Not only that, but each party in the transportation field, the corporations and the public, has accepted his decisions as good law and good sense and have lived up to them as embodying substantial justice for both parties. Many new questions have arisen where new precedents had to be set. He has been very thorough in his study of separate subjects, in order that the body of principles he was building up should not only be the best for their special cases, but should be consistent with each other throughout and make a harmonious whole upon which future action could be taken with assurance that the principle was sound in both theory and practice.

Chief Justice Knowlton of the Supreme Court once said to a legal friend that Chairman Jackson's decisions were remarkable for their inclusion of the essentials and their omission of the non-essentials. Plenty of evidence of this trait will be found running through the decisions printed in the annual reports of the board. It has been the aim to be guided only a little by technicalities, but largely by the general principles at issue. This element, too, will be found abundantly in the decisions in the annual reports.

A further principle of general policy has been co-operation with local authorities, and not antagonism to them in the settlement of local issues, with clearly marked distinction between state policies and matters of purely local concern. This grows out of

the supremacy given by recent law to the board over the local authorities, in order that there might be uniform application of the same principles all over the state. Subject to these general principles, the board has regarded the local authorities as largely as possible, and the consequence has been harmonious working together of the board with city governments and selectmen. In numberless cases the board has acted as advisor rather than supervisor in adjusting questions between selectmen and street railway management.

The Massachusetts anti-stock-watering laws have been carefully guarded in spirit and letter. Western Massachusetts will remember the defeat of the proposed legislation to permit the western Massachusetts street railway company to secure special privileges that would have overthrown fundamental principles of an anti-stock-watering nature. Another illustration is where the board was instrumental in the defeat of the proposition of the Boston & Maine Railroad in trying to get authority to capitalize the purchase price of street railways, where such price might include value of franchise and of earning capacity. Besides these conspicuous instances, the board is giving illustrations constantly on a smaller scale in its decisions regarding the issue of stock and bonds by railroad and street railway companies. The spirit of the law has never been violated.

Massachusetts leads in the use of block signals. An illustration of the force emanating from the board is seen in the case of the disaster two years ago at Baker's bridge, near Concord, resulting in a thorough overhauling of the system on the Boston & Maine, involving the expenditure of a large amount of money. The board has urged similar action upon other railroads.

In regard to the service the companies must render the public and which the public can demand from the companies, the writer has heard it stated over and over again at hearings—and the same principle is embodied in repeated decisions—that capital has a right to a reasonable return; that private persons cannot reasonably be expected to put their money into a means of serving the public and be expected to perform the service at constant loss. A company is justified in charges sufficient to yield a reasonable dividend upon the investment. On the other hand, the franchise is given by the public in order that the public may be served. Therefore a company is not justified in cutting off a particular train or car because it is unprofitable taken by itself. But if it serves a public need, and the company, considering all its income, can perform the service, it must do so. Necessities of transportation

must be provided as far as possible. But when it comes to giving the public luxuries, then it is a question how far the income justifies it.

During this administration the powers of the board have been increased in respect to the elimination of grade crossings, and have been extended over street railway locations and over methods of constructing and operating street railways. Recent laws also give authority over steamships and express companies. In practice but little has been done under this law, but it is a fair presumption that the same principles will be applied as hitherto in the regulation of transportation companies. Special duties have been imposed upon the board from time to time, showing the confidence of the Legislature and its readiness to use the board as a sort of public utility commission. It was put in charge of the construction of the new bridge between Fall River and Somerset. It has supervisory powers over the construction of the Cape Cod canal, and at the last session of the Legislature it was given the determination of questions affecting important public improvements in Springfield. The board, further than this, has been many times consulted by the committees on railroads and street railways, officially, as well as by members of the Legislature individually, in regard to pending



James F. Jackson.

legislation. Some particular measures of high importance are as follows: In 1901 the board recommended the 500-mile mileage book. This was adopted and put in force by all the railroads. The next annual report said: "This was a step toward bringing about a rate of two cents a mile for long distance travel. Under continued conditions of prosperity such standard charge is to be expected at an early day." Under the lead of President Mellen, of the New Haven road, the board's suggestion of a standard rate of two cents a mile has been carried out. Discussing a reduction of rates the board said: "It is at times necessary to make demands upon companies which involve a possible loss of revenue in order to secure what is due to the public. This should be done, however, only after careful inquiry and study of consequences. Any policy which jeopardizes the prosperity of a company through reckless interference with earning power is as unfortunate for the public-at-large as for the stockholders."

As to workingmen's fares, the board after an investigation in England and in this country, established the state policy that such fares rest not upon class distinction, but upon business principles, saying: "This question is a business problem to be solved upon business principles and not one of enforced contributions to a public charity, either from the railroads or from the more prosperous to the less prosperous part of the community. The true ground for a cheap morning and evening service is the fact that daily travel between home and place of business at fixed hours affords the carrier the most favorable condition for economical operation, and therefore entitles those who so travel to the lowest fares which are consistent with a reasonable return upon capital."

The board has consistently favored a monopoly in the street railway service of a large municipality. It applied that principle in Boston and later in Springfield. As stated in the decision in the Springfield case: "A monopoly in local street railway service under proper supervision should give the public a better service than the efforts of contending companies in infrequently struggling to keep alive enterprises which ought never to have been undertaken. Under our laws such a monopoly is founded upon statutes which protect the public interests by making street railway locations not only subject to supervision, but to revocation for cause, practically, therefore, dependent upon good behavior of the company."

Malay Railroad Projects.

The Federated Malay States Railways are about to build a line from Gemas, Negri Sembilan, to Kuala Semantan, Pahang. The permanent survey has been made, construction authorized, and work is to be started almost immediately. It is difficult to over-estimate the importance of having railroad communication in a state like Pahang, which is still almost entirely undeveloped, where distances are great, and where the mineral and agricultural possibilities are admittedly promising. This road, together with the 150 miles of trunk line now under construction between Benta and Kuantan, will pass through and throw open a large area of hitherto practically unknown and inaccessible country, valuable for mining and plantations. The line is about 70 miles long, and up to December 31, 1906, \$44,482 had been spent on its survey. At that time, over \$7,560 had been spent on railroad surveys in Pahang. These included a trial survey from Kuala Semantan, the terminus of the Gemas line, to Kuantan. This line will be a little over 76 miles long, and is estimated to cost \$4,635,368. Another trial survey was made from Kuala Semantan to Lipis, via Kuala Tembeling, 47 miles. This line, if built, will tap the Tembeling Valley midway between Lipis and Temerloh, and will open up a large area of agricultural land. A survey was also finished last year, at a cost of \$10,000, from Kuala Semantan to Lipis via Bentong, on the Pahang trunk line, to Kuala, 58 miles. This line will not go nearer than eight miles to Bentong, which will have to be reached by a branch from Kuala Semantan.

The Ship Lift on the Dortmund-Ems Canal.

At the present moment when so much interest is being taken in large canal construction schemes in several countries, it is of interest to show views of an important piece of work that was carried out a few years ago on the Dortmund-Ems canal—the ship lift, situated near Henrichenburg.

The highest level of the canal between Munster and Herne is



View in the Trough During Construction of Ship Lift.

situate about 192 ft. above the mean level of the North sea, and this difference of elevation is met by a series of locks. The section from Munster to Herne is about 42 miles long, and it crosses the Stever and Lippe rivers by strongly built aqueducts. The industrial town of Dortmund is connected with the canal, and therefore with the North sea ports, by means of a 10-mile branch canal to the highest level. There is a difference of elevation at the junction



Transfer of a Vessel from Upper to Lower Level.

of this branch with the main canal of from 45 to 52 ft., according to conditions, and instead of employing a series of locks this difference is overcome by means of the ship lift near Henrichenburg. In this way delays are avoided, and several additional locks would also have involved the consumption of great quantities of water.

The apparatus, as built by Haniel & Lueg, of Dusseldorf, con-

sists of a vertical floating lift with several submerging floats, by means of vertical cylinders standing in single wells, with parallel guidance on the Jebens' system for the trough, by vertical and revolving screw spindles.

The movable tank is filled with water, and in it the vessel can be lifted or lowered. There are five floats which entirely submerge in five shafts which are completely filled with water. These floats are connected to the water tank by built-up columns. The floating

a ledge projecting inside the trough. Similar gates separate the canal levels from the lift. In order to open the gates, when the trough is in the correct position against the level, the corresponding gates of the level and the trough are coupled and lifted together. The gates can only be lifted if the trough is in the exact position; otherwise the gear is locked. The trough cannot be moved unless the gates are closed.

As to the capacity of the lift, the vessels to be transferred have the normal burden of 600 tons. The length of the largest regular vessel is 223 ft., breadth of hull 25 ft., with a draft of 5 ft. 7 in. The vessels are transferred over the lift afloat. The depth of water in the trough under ordinary conditions is 8 ft. 2 in., so that with the greatest immersion there is still ample water beneath the vessel. Therefore when necessary a burden of 1,000 tons can be borne. The speed of the trough in the vertical ascent and descent is about 4 ft. per second. The weight of the filled trough, its supports and five floats is 3,100 tons.

The large screw spindles of the gear for regulating the ascent and descent of the trough are driven by an electric motor, and all other movements of the lift are done electrically, such as the lifting devices for the lift gates at the divisions of the trough and levels, also the capstan for handling the vessels in and out of the trough. There is a special generating station from which the necessary electric power is obtained. In the case of self-propelled steamers, such as passenger vessels, one can be transferred from one level to the other in from four to five minutes, during which it has gone some 100 to 150 meters of its journey. Heavy vessels which have to be hauled in and out by capstan occupy 12 minutes.

We understand that it has been found possible in 21 working days of eight to ten hours each, to effect 600 single transfers.

The working expenses for a single transfer amount to two to three shillings (average), reckoning that the full use of the lift is required. The cost of the undertaking was approximately \$625,000.

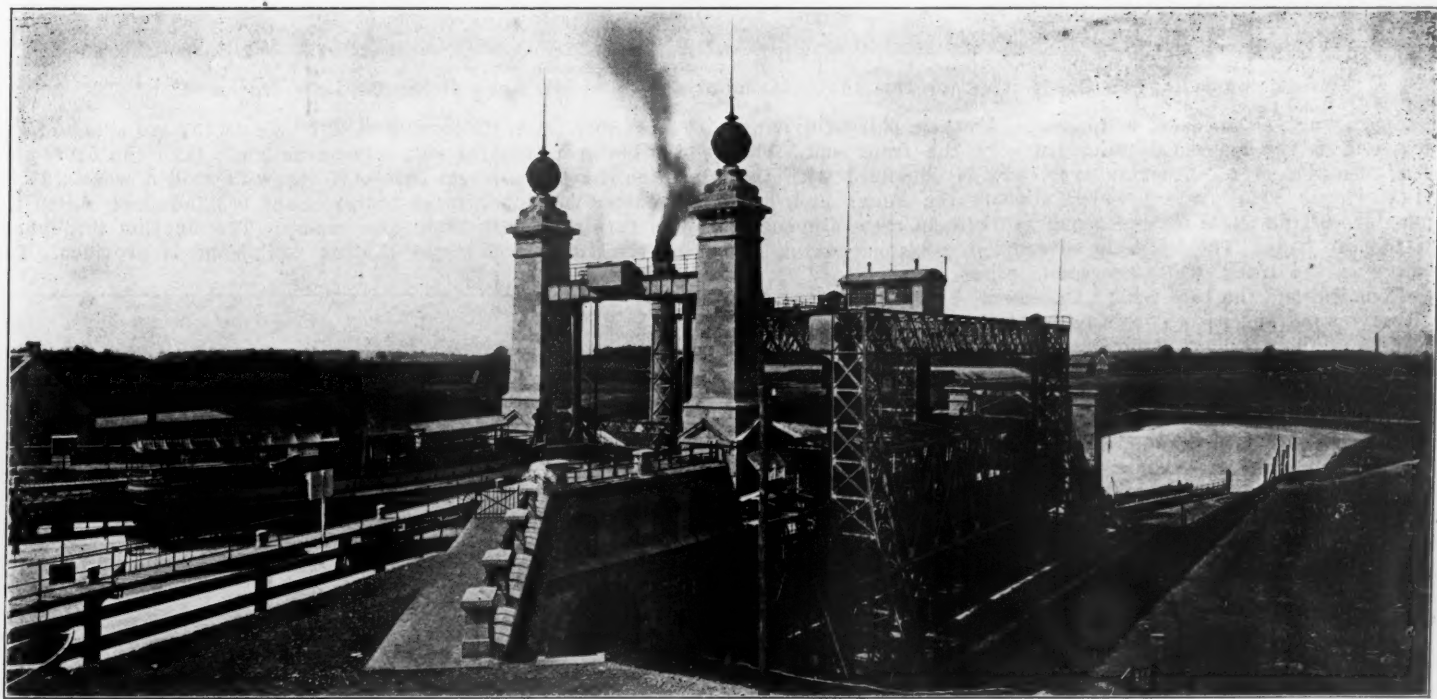
The Shantung Railroad, which is 271 miles long, on the average ran 2.5 trains each way daily in 1906, the regular service being two mixed trains daily, and the remainder consisting of special,



Shafts for Ship Lift While Being Built.

capacity of the five floats, which is always constant, is exactly equal to the weight of the water tank. The result is that the weight of the tank moves up and down at any height without the expenditure of power.

A screw gear is connected with the "trough" to regulate the movements as required. Four screw nuts are secured to the trough and move over four strong screw spindles, which are connected to



Henrichenburg Ship Lift, from Upper Level.

a common gear, whereby the trough is moved up or down. The screw spindles and their neck bearings are of such dimensions that the whole weight of the trough, or even the whole lifting power of the floats, can if necessary be borne by them.

The trough is closed at each end by a vertical lifting gate, having at its periphery a ledge of rubber jointing which rests against

extra and work trains. The average train had 34½ axles, and more than two-thirds were under freight cars. The average passenger movement was 786 each way daily, and the average freight movement 237 tons each way daily. Of the total 419,814 tons of freight shipped, 54 per cent. was coal, 9½ per cent. beans, and 6¾ per cent. cotton. The road passes through a densely peopled district, and

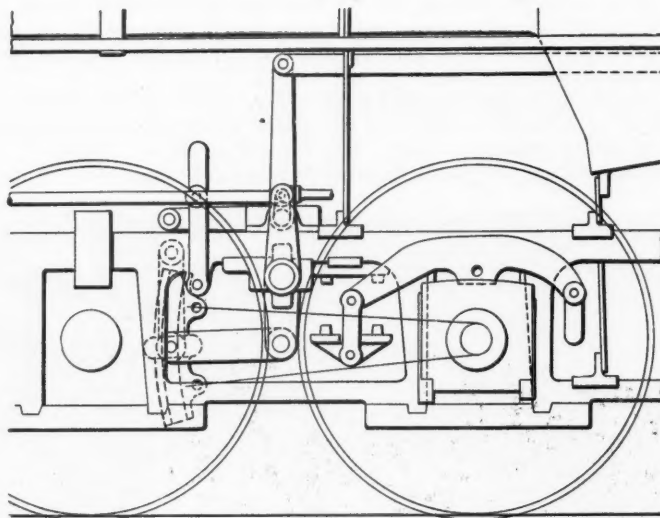
the small amount of freight, aside from coal, indicates that the Chinese have not yet learned to use the line. The gross earnings were \$1,084,448 in our money, or \$4,002 per mile. Of this amount 42 per cent. went for working expenses, leaving net \$2,321 per mile, which is moderate interest on the cost. The road has 481 employees, all but 57 of whom are Chinese. There is a considerable number of railroads in China, and there will certainly be a great many more; but it is not often that we have definite reports of their traffic and earnings.

Locomotives for South Manchurian Railroads.

The Baldwin Locomotive Works have recently built for the South Manchurian Railroads 20 consolidation locomotives for freight service and two steam inspection cars. These engines are of the standard 4-ft. 8½-in. gage and were built to American designs throughout. The consolidation locomotives will be used on a section of the line, where the grades are 1 per cent. and where the curves are of 990 ft. radius, or of about 5 deg. 45 min. The cylinders are single-expansion with slide valves, which are driven by the Stephenson link motion. As will be seen by the engraving the link itself is set well ahead and up close to the second driving axle, in order to secure as great a length of eccentric rod as possible, and then a short transmission bar is used to deliver the motion back to the rocker, which is set between the main and second drivers where there is a space to receive it.

The boiler is straight topped with a wide firebox which is supported by buckle plates at each end. The equipment includes automatic air-brakes, the Le Chatelier water brake and steam heating appliances. The engine truck and tender wheels are of rolled steel.

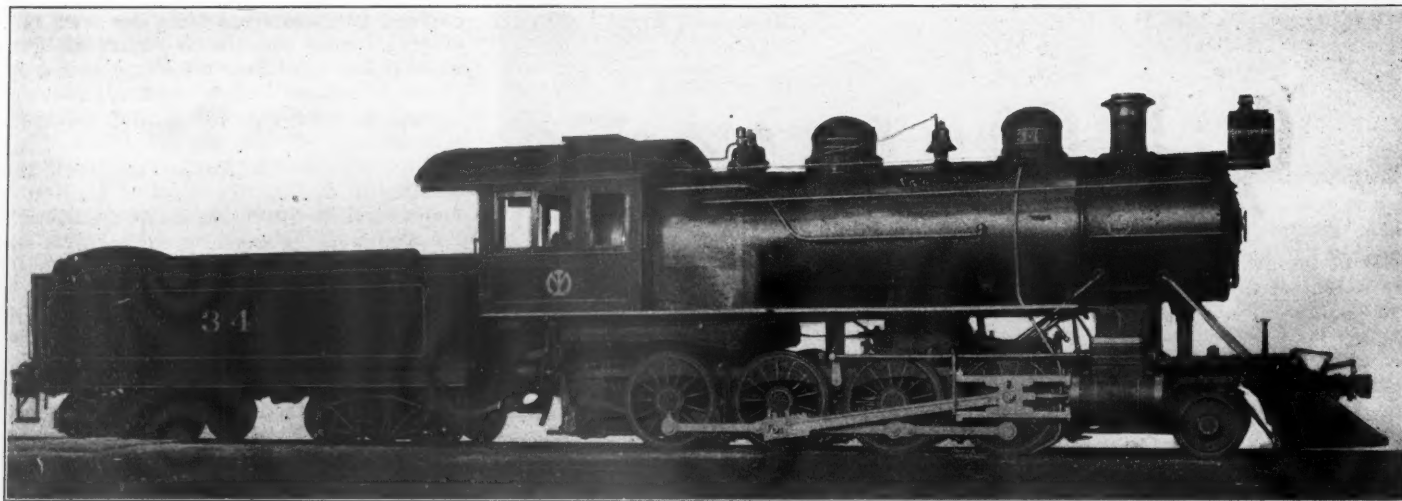
The inspection cars are each carried on a four-wheeled pas-



Link Motion of Consolidation Locomotive; South Manchurian Railroads.

having a capacity of 875 gallons. It is filled by a funnel extending up through the roof.

Air sanding devices are applied to the driving wheels and air-brakes to both the driving wheels and those of the rear truck. The car bodies were built by the Pennsylvania Railroad. They

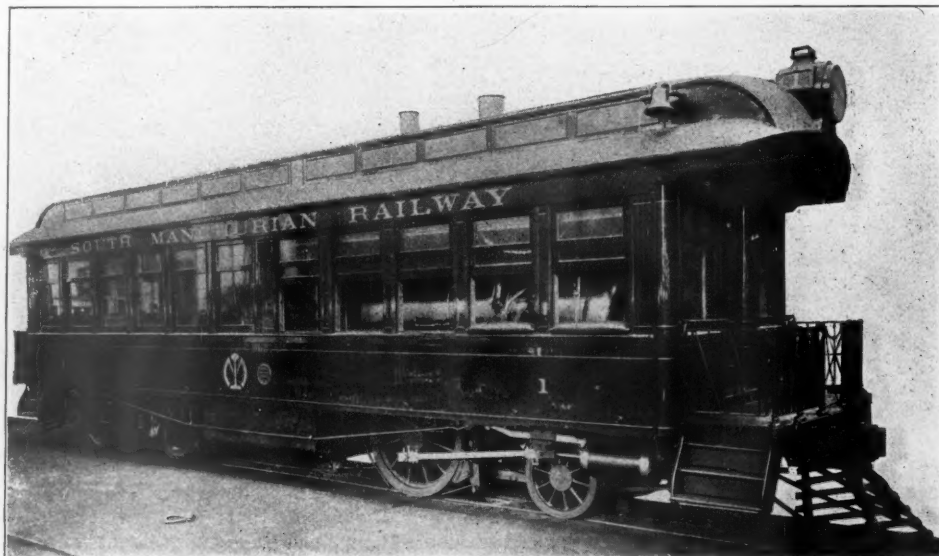


Consolidation Locomotive for the South Manchurian Railroads, Built at the Baldwin Works.

senger car truck at the back end, and on a single pair of driving wheels and a two-wheeled leading truck at the front end. The leading truck is of the Rushton type, and is equalized with the driving wheels. The frames which support the boiler and machinery are of the usual bar form and are held in rigid alinement with the car body. The boiler is reversed in position, having its firebox over the truck, while the steam pipe passes out through the back head. On emerging it curves out and passes down on the left-hand side of the fire-door, returning again to the center line below it and ending in a tee from which branch pipes lead out on either side to cast elbow connections bolted to the saddle just inside the frames, from which there is a passage of the ordinary type to the steam chests. This arrangement of placing the cylinders at the firebox end of the boiler requires the use of a rather long exhaust pipe; one that extends the whole length of the firebox and shell to the smokebox. It is, however, comparatively free from bends.

The operating mechanism is conveniently located at the forward end of the car, and the enginemen have an unobstructed view through the front and side windows. The coal box is placed on the left-hand side. It is 17 in. wide by 2 ft. high and 8 ft. long, and has a hinged cover extending its whole length. The capacity is about 22½ cu. ft., or a storage for a little more than a half ton of coal. The water tank is suspended from the body back of the engine frame, and extends the full width of the car,

have a timber frame measuring 36 ft. long over the end sills and 9 ft. 9 in. wide over the side sills. The rear truck is of the usual construction, having a wheel base of 7 ft., with chilled wheels 33 in. in diameter. The passenger compartment is handsomely fitted up, and is furnished with eight arm chairs. The lighting throughout is by electricity and steam heating equipment is provided. The

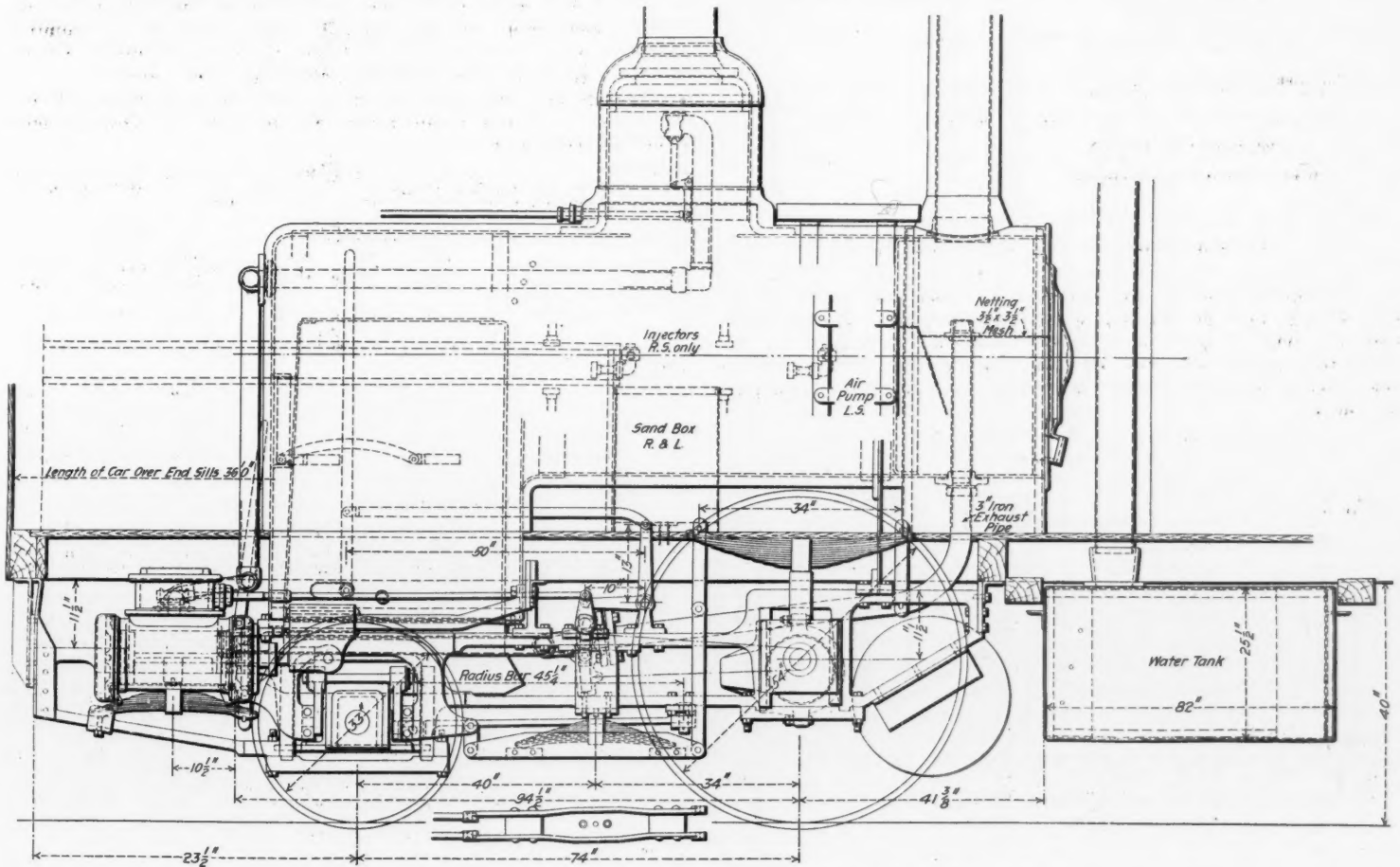


Inspection Engine for South Manchurian Railroads, Built at the Baldwin Works.

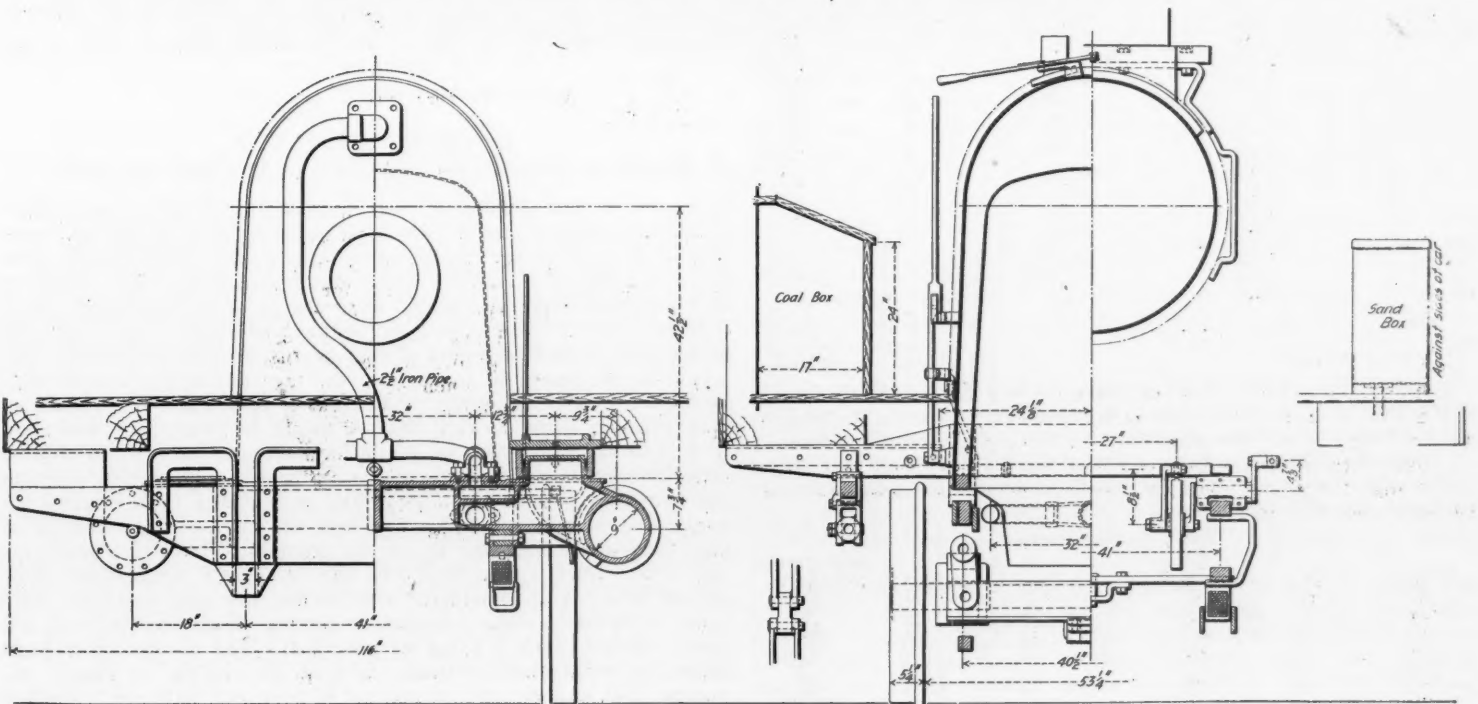
equipment includes automatic couplers and iron pilots at each end.
The following are some of the principal dimensions of these engines:

	Consolidation.	Inspection.
Cylinder diameter	21 in.	9 in.
Piston stroke	28 "	16 "
Boiler diameter	74 "	40 "
Boiler, thickness of sheets	$\frac{3}{16}$ "	$\frac{7}{16}$ "
Working steam pressure	180 lbs.	160 lbs.
Fuel	Soft coal.	Soft coal.
Firebox, material	Steel.	Steel.
" length	101 $\frac{15}{16}$ in.	36 $\frac{3}{16}$ in.
" width	65 $\frac{1}{2}$ in.	38 $\frac{1}{4}$ in.
" depth, front	73 $\frac{1}{4}$ "	49 $\frac{1}{2}$ "
" depth, back	64 $\frac{1}{2}$ "	49 $\frac{1}{2}$ "
" thickness, sides and back	$\frac{5}{16}$ "	$\frac{3}{8}$ "
" " crown	$\frac{3}{8}$ "	$\frac{3}{8}$ "
" " tube	$\frac{1}{2}$ "	$\frac{1}{2}$ "
" water spaces	4 "	2 $\frac{1}{2}$ "
" water spaces, throat	2 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "
Tubes, material	Iron.	Iron.
" number	346	144

Tubes, diameter	2 in.	1 $\frac{1}{2}$ in.
" length	14 ft. 6 in.	5 ft. 6 $\frac{1}{2}$ in.
Heating surface, firebox	173 sq. ft.	51.6 sq. ft.
" tubes	2,610 "	308.4 "
" total	2,783 "	360.0 "
Grate area	46.6 "	9.6 "
Wheels, diameter, driving	54 in.	54 in.
" " truck	33 "	33 "
" " tender	33 "	33 "
Journals, main driving	9 $\frac{1}{2}$ x 10 in.	5 $\frac{1}{2}$ x 8 in.
" trailing, driving	9 x 10 "	4 x 8 in.
" engine truck	5 $\frac{1}{2}$ x 10 "	4 x 8 in.
" tender	5 x 9 "	4 $\frac{1}{2}$ x 8 "
Wheel base, rigid	15 ft. 4 in.	6 ft. 2 in.
" " engine	23 " 8 "	28 " 3 "
" " engine and tender	55 " 9 $\frac{1}{2}$ "	28 " 3 "
Weight on driving wheels	148,800 lbs.	25,400 lbs.
" front truck	20,300 "	28,200 "
" total engine	169,100 "	48,600 "
" engine and tender	270,000 "	72,600 "
" back truck	24,000 "	24,000 "
Tank capacity, water	5,000 gals.	875 gals.
Tank capacity, coal	10 tons.	3,264 lbs.
Tractive effort	32,700 lbs.	3,264 lbs.



Longitudinal Section of Inspection Engine; South Manchurian Railroads.



Cross Sections at Waist and Cylinder; Inspection Locomotive.

Weight on drivers	=	4.55	7.78
Tractive effort			
Total weight	=	5.17	21.63
Tractive effort			
Tractive effort x diameter drivers	=	634.5	489.58
Heating surface			
Heating surface	=	59.72	37.44
Grate area			
Firebox heating surface	=	62.1*	14.33
Total heating surface			
Weight on drivers	=	53.49	70.55
Total heating surface			
Volume two cylinders in cu. ft.	=	11.22	1.18
Total heating surface	=	248.04	305.08
Volume of cylinders			
Grate area	=	4.15	8.14
Volume of two cylinders			
Tube heating surface = firebox heating surf. (Vaughan formula), sq.ft.		686.84	127.0
Total equated firebox htg. surf., sq.ft.	=	859.84	178.6
Total heating surface			
Total equated heating surface	=	3.24	2.02

*Per cent.

Football Travel on the New Haven Road.

The annexed tables give returns for passenger travel on the New Haven road on the day of the Yale-Princeton football game Nov. 16, 1907, as well as comparative tables of receipts for corresponding games and for the Yale-Harvard games of 1904 and 1906, some of which have never heretofore been printed. The figures are official.

YALE-HARVARD FOOTBALL GAME SERVICE NOV. 16, 1907.

Trains from New York.

Train.	Left New York.	Arrived New Haven.	Cars in train.	Passengers.
Special A	7:55 a. m.	9:51 a. m.	12	531
" B	10:01 " (Stmfrd)	10:58 "	10	263
" C	8:58 "	10:52 "	12	858
" D	9:15 "	11:01 "	12	920
" E	9:36 "	11:29 "	12	848
" F	10:50 " (Stmfrd)	11:55 "	12	726
" G	9:51 "	11:45 "	12	915
" H	10:05 "	11:52 "	12	989
" I	10:20 "	12:00 noon	10	287
" J	10:29 "	12:14 p. m.	10	290
" K	10:34 "	12:22 "	10	315
" M	10:31 "	12:25 "	12	966
" N	10:40 "	1:06 "	10	322
" O	10:45 "	12:55 "	10	440
" L	10:41 "	1:00 "	12	798
Emergency	10:58 "	1:16 "	12	730
Emergency	12:22 p. m. (Bdgrpt)	12:45 "	10	401
Princeton team	10:00 a. m. (Norfolk)	12:29 "	2	33
Special	10:30 " (Wtrbry)	11:54 a. m.	8	441
" R	10:25 " (Hrtfrd)	11:35 "	10	817
" S	10:55 " (Hrtfrd)	11:55 "	10	419
" T	12:10 p. m. (Hrtfrd)	1:09 p. m.	10	182
Total			230	12,491

Trains from New Haven.

Train.	Left New Haven.	Arrived New York.	Cars in train.	Passengers.
Special A	4:46 p. m.	6:34 p. m.	12	888 1/2
" C	5:01 "	6:53 "	12	343
" D	5:10 "	7:03 "	12	387 1/2
" I	5:21 "	7:13 "	10	283
" J	5:25 "	7:19 "	10	273
" E	5:27 "	7:26 "	12	1,203 1/2
" F	5:35 "	7:56 "	12	881 1/2
" K	5:35 "	8:00 "	10	332
" G	5:48 "	7:47 "	12	751 1/2
" H	6:00 "	8:00 "	12	973
" M	6:15 "	8:22 "	12	779 1/2
" N	6:18 "	8:12 "	10	294
" O	6:29 "	8:33 "	10	415
Extra 837	12:06 a. m.	2:03 a. m.	8	193
Special U	5:25 p. m.	6:36 p. m. (Hrtfrd)	10	326
" V	5:44 "	7:30 " (Spgrld)	8	664
Special	6:01 "	7:30 " (Wtrbry)	8	233
Total			182	9,221
Total both ways.			412	21,711

Special "E" of the outgoing trains to New York with its 1,203 1/2 passengers in 12 cars, or more than 100 passengers per car, suggests the elasticity of a train immediately after a big football match.

Some returns of the regular trains for the day, with four trains containing 33 cars excluded for which no figures for passengers are returned, are also of interest:

Going to New Haven.

Train.	Cars.	New Haven passengers.	Train.	Cars.	New Haven passengers.
No. 46	12	600	No. 809	7	411
" 276	5	172	" 45, 1st sec.	6	161
" 50	12	300	" 45, 2d sec.	12	626
" 10	6	154	" 49	10	160
" 12	12	510	" 9	6	43
" 278	8	140	" 61	10	106
" 52	12	225	" 635	8	260
" 54, 1st sec.	12	48	" 1107	8	450
" 54, 2d sec.	12	275 1/2			
" 65	11	475	Total	169	5,116

Outgoing from New Haven.

Train.	Cars.	New Haven passengers.	Train.	Cars.	New Haven passengers.
No. 53	7	204	No. 59, 1st sec.	9	448
" 287	5	416	" 59, 2d sec.	12	293
" 17	12	389	" 23	9	96
" 289	10	108	" 25	12	359
" 55	12	386	" 293	7	170
" 21	11	383			
" 57	12	343	Total	118	3,595

The outgoing and incoming passengers at New Haven by the regular trains for which returns are given number 8,711, of whom a large but uncertain number were undoubtedly football passengers.

The official schedule shows that of the 22 special trains reaching New Haven 12 were from two to 23 minutes ahead of time, most of them ahead by double figures; five trains were from five to 26 minutes late from various causes; and five were on time. Of the 17 outgoing specials no returns are given. The schedule for the regular trains shows that, as was to be expected, it was deranged considerably by the football traffic. Out of 18 incoming trains all but two were late by from one to 54 minutes. No returns are given for the outgoing trains from New Haven.

The official tables annexed show graphically the great volume, the increase and the remunerative character of the New Haven's annual football traffic:

STATEMENT SHOWING APPROXIMATE AMOUNT OF BUSINESS ON ACCOUNT OF Yale-Princeton Football Game at New Haven, Nov. 16, 1907, Compared with Business of the Same Occasion, Nov. 18, 1905.

	No. of one-way passengers.			Revenue.		
	1907.	1905.	Inc.	1907.	1905.	Inc.
New York excursion	13,418	15,568	2,150*	\$20,127	\$23,370	\$3,243*
New York regular	4,547	2,434	2,113	6,820	3,651	3,169
Other stations, excursion and regular	15,634	12,527	3,107	14,021	9,900	4,121
Total	33,599	30,529	3,070	\$40,968	\$36,921	\$4,047
Parlor and sleeping cars:						
Special				\$2,031	\$2,334	\$303*
Regular				1,539	1,217	322
Total				\$3,570	\$3,551	\$19
Total revenue				\$44,539	\$40,472	\$4,067

*Decrease.

†Sleeping cars used as parlor cars.

STATEMENT SHOWING THE APPROXIMATE AMOUNT OF REVENUE ACCRUING TO the N. Y., N. H. & H. R.R. on Account of the Yale-Harvard Football Game at New Haven, Nov. 24, 1906, as Compared with Business Account Similar Game at Same Place, Nov. 19, 1904.

	1906		1904		Increase	
	No. passengers.*	Revenue.	No. passengers.*	Revenue.	No. passengers.*	Revenue.
Special ticket business.						
New York	11,086	\$16,629	10,092	\$15,345	994	\$1,283
Boston.†	6,052	15,476	5,002	13,982	1,050	1,494
Boston.‡	1,876	2,103	846	956	1,030	1,146
Providence	232	413	282	753	d50	d340
Springfield	642	802	818	1,022	d176	d220
Hartford	1,142	856	1,766	1,324	d624	d468
Bridgeport	1,670	584	1,000	350	670	234
Other points	2,619	1,694	1,876	1,213	643	481
Total	25,219	\$38,559	21,682	\$34,947	3,537	\$3,611
Excess of regular business.	16,236	17,265	10,848	13,495	5,387	3,770
Total	41,454	\$55,824	32,530	\$48,443	8,924	\$7,381
Parlor and sleeping cars:						
New York		\$2,008		\$1,318		\$690
Boston.†		2,842		2,008		834
Other points		2,227		1,897		330
Total		\$7,077		\$5,223		\$1,854
Grand total	41,454	\$62,901	32,530	\$53,666	8,924	\$9,235

*One way.

†Via Shore, Air and Hartford lines.

‡Via Springfield.

d Decrease.

Wastes of Fuel, Power and Time in Railroad Operation.*

* * * The problem of fuel consumption or better combustion of fuel is a serious matter. On most roads there is no one man who is held accountable for the amount of fuel used. It would seem that there is room on a railroad to-day for a man whose title might be fuel superintendent, who would have charge of and direct the work now done by the fuel agent, including inspection of coal and the assignment of certain grades of coal to various coaling stations. He would be so closely in touch with the mechanical department that he would be able to advise what class of coal was to be furnished each division point, so that engines might be drafted for the class of fuel to be burned, and he would have on his staff a corps of traveling firemen to see that the men were properly instructed concerning the principles of combustion and were firing their engines according to correct principles, and that the engines were drafted so that they would burn the fuel in an economical manner when properly fired. Such a man should be able to effect a wonderfully large saving when it is considered that to-day the fuel agent in some cases is trying to make a record by buying cheap fuel and will not admit there is such a thing as poor coal. The mechanical department, to avoid steam failures, is drafting engines to handle the poorest fuel, and the men on account of poor coal, improperly drafted

*From a paper presented to the Traveling Engineers' Association Convention by D. C. Buell.

engines or lack of interest are burning from 10 to 20 per cent. more fuel than necessary.

Of other channels through which energy is wasted may be mentioned the following:

Coal Wasted.

Coal not properly inspected at the mines, allowing slack and dirt in considerable amounts to take up space in cars, tanks and fireboxes that the coal should occupy, to say nothing of the loss caused by dirty fires, clinkers, etc.

Coal spilled at coal chutes and not picked up.

Coal stolen all along the line.

Coal wasted on account of improper or wasteful methods of firing up engines at the roundhouse.

Coal spilled from engine tanks being filled too full.

Coal spilled from engine deck on account of its not being kept clean.

Coal wasted through grates on account of the fireman shaking grates improperly.

Coal wasted on account of firing not being properly done.

Heat Wasted on Account Of—

Ash-pans not properly made for admission of air to give proper combustion or not kept cleaned out.

Engines not drafted right to give proper combustion.

Boilers or flues being dirty.

Steam leaks in firebox or front-end that interfere with the proper combustion of the fuel as well as wasting heat by the leakage.

Forcing the fire too hard, drawing the gases out of the stack at too high a temperature.

Engines not properly lagged.

Heat wasted which might be saved by hollow fire-brick arches, combustion tubes, feed-water heaters or special devices of this nature that have been proven economical.

Steam Wasted Due To—

Valves or cylinder packing blowing.

Cylinders not smooth. That is, where the inside of the cylinder wall has not become glazed so as to reflect the heat and keep it in the cylinder, instead of absorbing it and radiating it out as a cylinder which is pitted or unglazed will do.

Leaks across steam passages.

Leaks in steam valves.

Pipes or fittings leaking, either on the engine or in the cab.

Improper location or piping or working of the injectors.

Air leaks on the engine or cars.

Steam heat leaks.

Hot water leaks at any point from boiler or fittings.

Steam wasted through the pops on account of the engine not being fired properly.

Power Wasted on Account Of—

Valves set improperly.

Lack of lubrication.

Improper feeding and firing of the boiler.

Improper running and handling of the engine.

Drafting the engine so as to give excessive back pressure.

Improper handling of the air.

Brakes set up too close.

The waste of time on a railroad is almost always accompanied by a waste of energy because cars, engines and men are lying around when they might be doing useful work.

Time Wasted at Roundhouse Due To—

Engineers not making proper work reports. Some one has said that the word "examine," as used by engineers on work book reports, has cost the railroad companies hundreds of thousands of dollars. Get the men to make correct work reports.

Inefficient or insufficient force not getting work done promptly, thus delaying a \$15,000 machine for want of a machinist or helper.

Sand house, coal chute, water tank and cinder pits not properly arranged. A study of the terminal may suggest some improvement in the layout that can be made at reasonable cost and would save more than enough in the cost of handling engines to pay the expense.

Lack of proper supplies at storehouse, requiring engineers to hunt up foremen and then spend more time robbing other engines to get what they want.

Lack of tools on engines, so that engineers cannot do necessary work promptly. A good locker room where tools, oil cans and overalls can be locked up will save most of this trouble.

Employing a boy who cannot be depended upon to do calling, when a few dollars more a week would pay for a man who would have some judgment and discretion and would save five times that amount in terminal overtime.

Not having a proper record of where men live and can be called.

Not having extra men enough to keep power moving as fast as ready and wanted.

Not having men called in time so they can get ready to go out on their call.

Time Wasted on Road Due To—

Not having proper tools on engines in case anything happens.

Trying to spot an engine at water tank with a long train instead of stopping short and cutting the engine off.

Not having fire in condition to go after meeting a train or getting orders.

Not oiling around promptly.

Engineer and conductor not working together to make meeting points or figure on station work.

Careless handling of train and pulling out drawbars and bad ordering cars.

Not watching for signals from train crew.

Not having a supply of sand at convenient points between terminals for bad weather or emergencies.

Engines not properly washed out, causing foaming and consequent loss of tonnage or time.

Allowing coal to get into tanks, stopping up injector supply pipes.

Not cleaning strainers in injector supply pipes at frequent intervals.

Water accumulating in main reservoir, thus requiring a longer time than necessary to release brakes.

Not keeping sanding devices in good working order, with result that engine slips badly in starting train or on hard pulls.

Engineer and fireman not working together so they will have steam and water where needed.

Fireman not awaking to the fact that ash-pan needs cleaning until engineer and train crew are ready to go.

Engineer "ying down" when something goes wrong with his engine when with a little thought and some energy he could have fixed things and brought his train in.

Crew stopping to eat just where it suits them without notifying the despatcher or regarding the possible disarrangement of his plans.

Engineer or conductor not advising despatcher if anything is going wrong so they cannot make the time expected of them. This hurts the other fellow at meeting points and maybe ties up the road.

Engineer not willing to admit there is anything wrong with his engine, resulting in long argument between engineer, conductor and despatcher with consequent waste of time. This is due in many cases to the fact that the engineer is "burned up" so badly if he admits an engine failure that he will deliberately say there is nothing wrong with his engine when he knows he could not make ten miles an hour with the train. Do not let the men get false ideas about not admitting there is anything wrong so the train can be reduced if necessary.

There is a great deal of energy wasted in the yard and on the road directly chargeable to the transportation department, part of the cost of which in many cases falls on the mechanical department. For example, time wasted in not having trains made up, crews ready or the yard open so the engine can get to the train and get out on call.

Indifference in matter of switching coal to chutes, cars of company material to the rip track or roundhouse, switching bad orders to the "rip" track and pulling and setting "rip" tracks properly, pulling cinder track, etc. Along this line may be mentioned the seeming delight some switchmen take in blocking the roundhouse leads, so engines cannot get in or out.

There is also time wasted getting the bills and orders, all of which is reflected in cost of coal charged against engines and wages of enginemen, etc.

On the road there may be waste due to poor distribution of time on schedules, poor despatching, slow orders out which should have been canceled, orders put out at points where it is hard to stop and start when some place where train would have to stop for water or a meeting point could have been used just as well.

Another waste is due to trains being made up improperly, loads behind instead of ahead, empty car doors open, short loads in what is supposed to be a through train, etc.

Slow orders put out by the maintenance department also add to the fuel bill, because unfortunately they are usually necessarily placed on track just at the foot of a grade or on a curve on some hard pull.

Many water tanks are located so that it is up-hill both ways away from them. Of course, the streams are usually found at the bottom of hills, but it is cheaper to pump water to a tank at the top of the hill than to pull the train from a standstill to the same point; stations are located so the train has to be stopped on a curve, and sidetracks so that with a full train the brakeman has to jump off and sprint for the switch, because "if they stopped they would have to double in."

Some one has said that "the eye of the master is worth the hands of all the servants." What a waste it is to have the master mechanic walk back and forth from office to office four or five times a day when a telephone would save him that time, and think of the two or three months' old correspondence the road foreman must answer, many times in long-hand, when he might be out on the road with some new man or new engine, saving energy instead

of wasting it. Work should be so arranged that it would not be necessary to keep a high-priced man doing cheap jobs. Following this same thought, some roads are noted for their prompt and courteous service and the fine discipline and loyalty of their men. Is it not due to good management, fair treatment and an example of loyalty, courtesy and fairness among their officials? The old saying, "Like master, like man," is true on railroads as elsewhere, and the waste of energy among a set of men who are not disciplined, are not loyal to the company or courteous to its patrons, is perhaps the greatest loss of all.

In view of the many ways in which energy may be wasted it may seem surprising that there really is any left. One must be alert and watchful to keep them down to a minimum for waste is a prolific creature and unless watched and controlled increases and multiplies to such proportions as to ruin good men's careers and wreck good roads.

Samuel M. Felton.

The resignation of Samuel M. Felton as President of the Chicago & Alton was announced last week. Control of the Alton passed to the Toledo, St. Louis & Western last August, and on December 4 Theodore A. Shonts, its President, was elected to take Mr. Felton's place. The consolidation of various offices of both roads has been gradually going in effect. Mr. Felton now goes to the Mexican Central to take the place of A. A. Robinson, who resigned as President a year ago. The new President's first training in the railroad service was as an engineer, and he has since had charge of both traffic and operation. Mr. Felton was born in 1853 in Philadelphia, Pa., and began railroad work as a rodman. He worked for six years in the engineering department of different roads in Pennsylvania which are now part of the Philadelphia & Reading. The next year he was made General Superintendent of the Pittsburgh, Cincinnati & St. Louis, where he remained for eight years. He was then appointed General Manager of the New York & New England, but in a few months went to the New York, Lake Erie & Western as Assistant to the President, in particular charge of the New York, Pennsylvania & Ohio, which is now part of the Ohio division of the Erie. He was made General Manager of the New York, Pennsylvania & Ohio at the end of the year, and the next year was elected Vice-President of the New York, Lake Erie & Western in charge of traffic; in a few months he was given charge of the operating department also. In 1890 he left to become President of the East Tennessee, Virginia & Georgia, now part of the Southern Railway. This office he held until 1899. During part of this time he was also Receiver of the Cincinnati, New Orleans & Texas Pacific; President of the Alabama Great Southern; Receiver of the Kentucky & Indiana Bridge Company, and Receiver of the Columbus, Sandusky & Hocking. In the fall of 1899 he was elected President of the Chicago & Alton, succeeding E. H. Harriman, who then became Chairman of the Executive Committee.

Injunctions in Alabama.

At Montgomery Nov. 27, Judge Thomas G. Jones, of the United States District Court, granted a restraining order temporarily suspending all the railroad legislation just passed by the Alabama Legislature as it applies to the Louisville & Nashville, the South & North Alabama, the Nashville, Chattanooga & St. Louis and the Central of Georgia. In the case of the Central of Georgia the order was made returnable December 16, and in the case of the other railroads December 2. These orders are directed to the sheriffs, solicitors and clerks of the counties and to all citizens, restraining them from attempting to enforce the laws until the court disposes of the litigation. Scores of deputy marshals were employed to serve the processes throughout the state. The Central Trust Company of New York, owner of the second preferred bonds

of the Central of Georgia, was complainant in the bill against the Central, but the other bills were filed by the railroads against the state. The bills attacked the classification acts of the special session as being "manifestly unfair and unjust." Railroads which entered into agreement with Governor Comer, it is alleged, received unjust and illegal preference over the railroads which refused to enter into the agreement. The Louisville & Nashville has filed a bill in the United States Court, praying that the litigation on the docket of the court in respect to the old laws shall not be dismissed.

It appears that, in all, 21 laws were passed affecting railroads. They were enacted indiscriminately, and almost without discussion. Governor Comer having declared that the contents of the bills did not much matter, the only issue being whether the state or the railroads should be supreme. It was boasted that the laws were "injunction-proof." The penalties for their violation were to be enforced from the day that the railroads took any of them into court to test their legality—either a Federal or a state court. Even the lawyers have difficulty in analyzing the acts or making sense of them.

As long as any state officer by designation had the power to enforce a rate law, that officer could be served with an injunction by a Federal judge; so the Legislature, in one of these laws, repealed an act which placed the enforcement of the rate law in the hands of the Railroad Commissioners, the Governor and the Attorney-General, and also enacted laws which made it a misdemeanor for ticket and freight agents to charge more than the maximum rates and gave passengers and shippers charged excessive rates a right of action, for 10 years, for damages against the railroad companies. It was supposed that there would therefore be no state officers to enjoin, but Judge Jones decided that the attempt to deprive the Federal court of jurisdiction could be met by employing a large number of special deputies and serving writs on practically everybody; the sheriffs, their deputies, solicitors, law clerks, passengers and shippers; and that was what was done.

Foreign Railroad Notes.

Investigations by the railroad administration at Königsberg showed that the heating value of the locomotive smokestack cinder produced varied from 6,930 to 11,160 B.t.u., depending on the kind of coal burned. In recent years the better grades of cinder have been sold for 40 cents per ton, a low price considering their heat value. With a view to a more profitable utilization of this material experiments were made with it for the production of power gas. As the result of these experiments two power gas plants using smokestack cinders have been built, the gas being used for the production of electric current. At the main shops at Königsberg there are three generators built by Julius Pintsch, and three double-acting Deutz gas engines, each with an output of 180 h.p. and direct-connected to a dynamo of 230 volts. The second plant, at Insterburg, has two gas generators supplying two single-acting Nuremberg gas engines of 90 h.p. each, each of these being belted to a dynamo of 230 volts. Both installations have proved in every respect highly satisfactory. At first the cinder consumption was rather high, 2.75 lbs. per h.p. hour. Changes in the gas generators have reduced this to 1.33 to 2.4 lbs. per h.p., according to the load on the dynamo. On the average 12 tons of smokestack cinders are produced per locomotive per year. Based on this a third installation, calculated for 150 h.p., is to be made.

The Prussian State Railroads have comparatively recently had a limited number of freight cars equipped with continuous brakes. It is now decided to increase the number, and during the current year 320 cars are to be equipped, and 140 next year, making a total of 600, which will for the most part be run in certain fast freight trains making regular trips. Heretofore, on certain lines, no more than 60 axles were permitted in such trains, but hereafter there may be 80.



Samuel M. Felton.

GENERAL NEWS SECTION

NOTES.

The yard trainmen on the Grand Trunk throughout Canada have had their pay increased 12 per cent. The change affects about 600 men.

The Chicago & Alton announces that henceforth in the state of Missouri passengers will be admitted to trains only on showing their tickets.

Judge Munger in the Federal court at Omaha, Neb., November 26, made perpetual the injunction granted a year ago forbidding ticket scalping in Nebraska.

At Bloomington, Ill., recently a fireman of the Illinois Central had an arm blown off by the explosion of a fusee. It is said that the fusee had not been lighted.

Freight trainmen on the New York Central heretofore running through between New York and Albany, 142 miles, will henceforth turn around at Poughkeepsie, about half way between the two cities.

One day last week the Wabash took out of Chicago on a single train 500 passengers bound for St. John, N. B., over the Canadian Pacific. At St. John the passengers were to take the steamship "Empress of Ireland" for Europe.

The lumber producers of Oregon, Washington and Idaho who complained against the increase in eastbound freight rates, announced by the transcontinental railroads a month ago, have filed a new complaint with the Interstate Commerce Commission. It is signed by 41 lumber companies.

The Brotherhood of Railway Trainmen has sent to the Postmaster-General a complaint charging that the tracks of the Missouri Pacific are in some places unsafe. The reason given for sending the complaint to the Post Office Department is that the lives of railway postal clerks are endangered.

The Texas State Railroad Commission on Nov. 26 ordered 38 railroads to purchase cars and engines. Fourteen roads had already been ordered to buy. It does not appear that these roads are insufficiently supplied with rolling stock, but, rather, that the orders are issued because the cars and engines in use are owned by parent companies not domiciled in Texas.

In the Federal court at Atlanta, November 30, Judge Newman refused the application of the Central of Georgia for an injunction against the reduced rates ordered by the State Railroad Commission. Judge Newman says that the railroad should put the new rates in force for six months so as to afford ground for a study of results, as compared with a similar period under the old rates.

Bank checks, issued in large quantities, payable to bearer, for use in place of currency, because of the scarcity of the latter have appeared in New York this week, the New York Central paying part of its December wages in such orders, marked payable through the Clearing House. At Chicago more than \$7,000,000 of this currency is in circulation. According to the New York Sun's reports from cities in central New York this so-called currency is usually cashed only at a 10 per cent. discount.

The Interborough Rapid Transit Co., operating the elevated and subway lines in Manhattan, New York City, has organized a uniformed police force for service at its most crowded stations. These officers will have full police power. The men appointed have been approved by the police commissioner of the city, after a thorough inquiry into their records, and regular city policemen will co-operate with the railway company's police when necessary. Fifty men began work in this service November 29.

The Supreme Court of the United States has decided that the Pennsylvania Railroad must show its books in the cases of the coal companies suing on a complaint of discrimination. The Webster Coal Company and the Pennsylvania Coal & Coke Company sued to recover damages alleged to have been sustained by reason of the road's discrimination in favor of other companies in the transportation of coal. The Supreme Court holds that officers of the railroad can be required to exhibit its books for inspection by the coal companies before the trial of the case itself.

On Monday last the Supreme Court in the case of the Louisville & Nashville vs. Bitterman and others, involving the right of the defendants to engage in scalping the tickets of the railroad company, decided in favor of the company, the decision being handed down by Justice White. The United States Circuit Court for the Eastern district of Louisiana held the practice to be wrong, but decided that relief could only be granted in individual cases, thus requiring a separate action for every offense committed. The Circuit Court of Appeals for the Fifth Circuit held that the wrongdoing was of a continuing nature and granted a permanent injunction.

The scalpers then carried the case to the Federal Supreme Court and have now lost it.

Stereopticons, as introduced on the Cincinnati, New Orleans & Texas Pacific several years ago by W. J. Murphy, are now in use on the Union Pacific, for testing the familiarity of trainmen with the indications of fixed signals. An officer of the Union Pacific says that the use of this means of education is to be allowed a part of the credit for the excellent records made by the engineers on that road, as shown by the surprise tests. On the Union Pacific and the Southern Pacific together the number of surprise tests now averages 45 a day throughout the year. In the last monthly record published, the number of surprise tests was 1,360; imperfect compliance, 17. In 12 classes, including the most important, the record was perfect.

The Union Pacific reports that under the special reduced rates offered by that company to stimulate the shipment of coal before winter a heavy movement has been going on from the fields of Utah and Illinois. The company itself has stored hundreds of thousands of tons at points along its lines and those of its allied roads nearly to the Pacific coast. The railroad company has furnished free storage ground, wherever necessary, to stimulate the shipment of coal from the mines. A record has been kept of the action of the shippers and consignees in response to the company's efforts to avert a coal famine, and if there should be a scarcity of fuel the records will be brought out to show who is responsible. New mines are to be opened near Kemmerer, Wyo., to produce 3,000 tons of coal a day, and another new mine near Rock Springs, Wyo. These mines will be opened by independent interests and the railroad companies are going out of the commercial coal business.

Honduras Railroad Building.

The Vaccaro Brothers Railroad, now being built along the north coast of Honduras from Lacelba west to Porvenir, Salado, San Francisco and Santiago, 35 miles, is expected to be in operation some time in the spring of 1908. Three spurs from the main line at different points will penetrate five to eight miles inland, tapping farming country, while projected extensions of these spurs will eventually reach hard-wood timber some 20 miles from the coast. The completion of this first instalment of the 150 miles of projected road is expected to divert the greater part of the marine commerce from the towns mentioned and centralize it in Lacelba.

Oregon's Forest Wealth.

The state forestry authorities report that Oregon has 300 billion feet of standing timber, substantially all of it soft woods. This is more than is reported for any other state in the union, and one-sixth of the estimated supply of the United States. At the present rate of consumption, not allowing for any new growth, Oregon's timber supply would last 150 years. At \$12 per 1,000 feet, the state's timber is now worth \$3,600,000,000, or more than the total amount of money in circulation in the United States. The most productive area lies west of the Cascades, where the average of standing timber is 17,700 feet to the acre, but many tracts are found that yield 50,000 feet, and single logs, that in the form of sawed lumber are worth from \$50 to \$100, are common. Six hundred saw-mills, employing 15,000 men, besides 7,000 men in the logging camps, produce two billion feet of lumber every year, for which the world's markets pay Oregon nearly \$45,000,000, including forest products of all classes. Federal withdrawal of extensive forest reserves and the state's new laws for the protection of its forests are depended upon to prolong indefinitely the existence of Oregon's timber supply as its principal source of revenue.

Alabama's Injunction-Proof Rate Laws.

Any one owning a patent process for turning out railroad-rate laws that are Judge-Jones-injunction-proof could probably get immediate employment with Governor Comer, of Alabama. The Governor will provide the legislature.

Governor Comer has just suffered another heart-breaking disappointment. He had tried one experiment with the Alabama rate laws and at once found himself tangled up in some of Judge Thomas Goode Jones' federal injunctions. At first it looked as if Governor Comer would join Governor Glenn, of North Carolina, and secede from the Union. On second thought, however, he decided to call his Alabama lawyers and Alabama legislators together and enact new anti-railroad laws that Judge Jones could not temporarily suspend by any of his federal restraining orders.

There were about 20 bills in all. They regulated passenger rates. They classified all kinds of freight. They fixed fares for

certain distances and between certain cities. They were to go into effect Dec. 1. And they were "injunction-proof."

The legislature passed them all and adjourned Saturday evening. Governor Comer signed the last of them Tuesday night and was waiting for the ink to dry when Judge Jones stepped in with another federal order restraining the State Railroad Commission, all solicitors, clerks of court, shippers and passengers from obeying or enforcing the Governor's injunction-proof laws until it could be ascertained whether they violated the Constitution of the United States.

It was tragic. And to think that it was all due to the notions about the United States Constitution held by a Southern jurist who had fought and shed his blood for the Confederacy, who had once been Governor of Alabama himself and who had been appointed United States District Judge by that other celebrated railroad regulator Theodore Roosevelt! Instead of going into effect next week, Governor Comer's injunction-proof laws must withstand the test of the courts. And the worst of it is, Governor Comer knows that if he interferes he is liable to go to jail by Judge Jones' orders for contempt.—*New York World*.

Reciprocal Demurrage in Texas.

The Texas State Railroad Commission has promulgated its order establishing "reciprocal" demurrage rules, effective December 10. The rules provide that freight in carloads must move at the rate of at least 30 miles a day and less than carloads 25 miles. Sundays and legal holidays are excluded and the rules do not apply to live stock and perishable freight. The time of the movement of a car is counted from the beginning of the second day after it is loaded. One day additional is allowed at division terminals. A 25-bale lot of cotton is to be treated as a carload. For failure to move freight promptly railroads must pay shippers as follows: Delay of 10 days or less, $2\frac{1}{2}$ cents per 100 lbs.; 20 days and over 10 days, 3 $\frac{1}{2}$ cents; 30 days and over 20 days, 5 cents; 40 days and over 30 days, 6 $\frac{1}{2}$ cents; 50 days and over 40 days, 7 $\frac{1}{2}$ cents, and for each additional 10 days or part thereof 1 cent per 100 lbs. Forty-eight hours' additional time shall be allowed at junction points or division terminals when it is necessary to transfer a shipment.

Shippers applying for cars must be supplied within three days, if five cars or less; within five days if nine cars; within eight days if 10 or more. In furnishing cars to shippers there must be no discrimination in favor of shipments going to stations on the home road. Failure to furnish a car according to the rule imposes a penalty of 50 cents a day, but only provided the shipper has deposited \$2 a car, which is to be retained by the company if he does not load. If empty cars have to be hauled 50 miles to deliver to a shipper he may be required to deposit \$5 a car; if hauled 100 miles a deposit of \$7.

Ordinary demurrage is \$1 a day after 48 hours. Failure to notify consignee of the arrival of freight involves a penalty of 50 cents, and the same is the penalty for failure to place a car promptly after a consignee has stated his wishes as to placing.

The rules for supplying cars to shippers allow less time than was stipulated in the suggestions offered to the Commission by the recent conference of railroad officers and shippers. It is now made obligatory upon the roads to furnish as many cars as are desired within eight days. Roads are required to average 30 miles for each 24 hours in the movement of freight. When the conference was called, the shippers asked for an average of $2\frac{1}{2}$ miles an hour, or 60 miles a day. The cutting down of the time to 25 miles a day was a concession from the shippers which was made after much parleying. In the Commission rules no provision is made for the exemption of railroads from penalties in cases of accident or other causes over which the roads have no control.

South Manchurian Railroad Rebates.

According to a consular report, the South Manchurian Railroad has decided to give rebates to heavy shippers. Those paying freight charges amounting to \$49,800 during the 12 months beginning October 1, 1907, will receive a rebate of 3 per cent. and one-half of 1 per cent. additional rebate for each additional \$24,900 in freight payments up to \$249,000. The rebate thus amounts to 7 per cent. at the last named figure and it remains at this percentage on all amounts greater than \$249,000. It is pointed out that Japanese merchants, as the largest shippers, will get most of the benefit of the system, giving them distinct advantages in competition with the exporters of other countries.

A New Builder of Gas Engines.

The Wisconsin Engine Co., Corliss, Wis., builder of Corliss steam engines, has begun the manufacture of gas engines for all services, in sizes from 400 b.h.p. to 5,000 b.h.p. The engines use natural, producer, coke-oven or blast-furnace gas in the Otto cycle, and are of the horizontal tandem and twin-tandem double-acting types. The company controls the Sargent patents on internal combustion en-

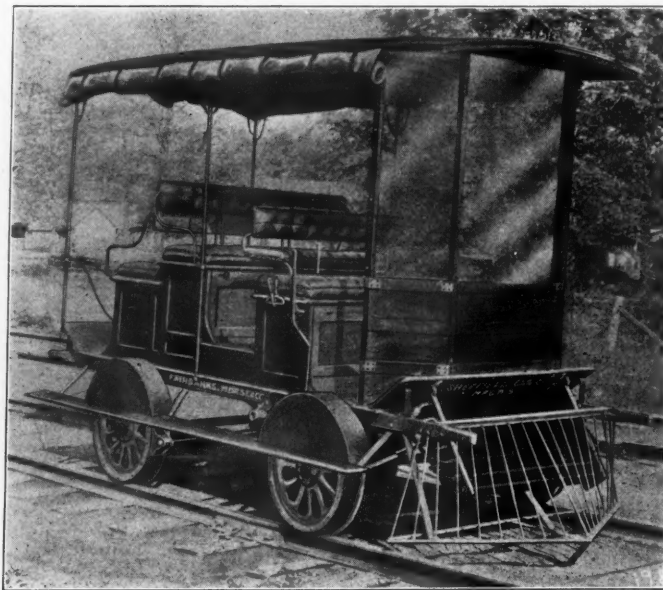
gines, and has Charles E. Sargent as the engineer of the gas engine department. Mr. Sargent is well known as an engineer, and in 1898 designed a horizontal tandem double-acting gas engine, which was a wide departure from the common practice of those days. It was then considered an impracticable type by many. Now, with one exception, all large units in this country are being built in that type.

The gas engines of the Wisconsin Engine Co. have some of the distinctive features of their large Corliss engines, and utilize in design most of the Sargent patents. The design is simple. There is but one poppet valve for each explosion chamber. It is located on the bottom of the cylinder and thus avoids cumbersome and unsightly air and gas pipes, as well as stairs, galleries and railings about the engine. Provision is made against the occurrence of dangerous pressures caused by possible pre-ignitions. The engines are started automatically. Tests of these engines, even small units, show a heat consumption of less than 9,000 b.t.u. per brake horsepower hour.

This company recently shipped some large steam engines to a number of large concerns, including the Illinois Steel Co., Jones & Laughlin Steel Co., Packard Motor Car Co., American Sheet & Tin Plate Co., Amoskeag Manufacturing Co., New Hampshire Spinning Mills, National Tube Co., the city of Milwaukee, Carnegie Steel Co., American Woolen Co., United States Envelope Co. and the Carnegie Natural Gas Co.

Fairbanks-Morse Motor Inspection Car.

The accompanying illustration shows the new type C gasoline motor inspection car sold by Fairbanks, Morse & Co., Chicago. The car is built by the Sheffield Car Company, Three Rivers, Mich. Much of the value of this kind of inspection car is due to its convenience.



Gasolene Inspection Car; Fairbanks, Morse & Co.

It can be kept ready for immediate use, as in a gas engine there is not the delay as in the case of the steam locomotive of getting up steam. Its maximum speed is comparatively high. One of the first cars made, which was sold to the Michigan Central, traveled 2,327 miles, consuming one gallon of gasolene in 19 miles and one gallon of lubricating oil in 17 miles. On this trip it ran 66.4 miles at the rate of 40 miles an hour and 39.6 miles at the rate of 53 miles an hour. The car illustrated here embodies several changes and improvements over this early machine.

Oklahoma Orders.

The Corporation Commission in the new state of Oklahoma issues a number of sweeping orders almost every day. One promulgated last week requires all railroads to build stations at state boundary lines, in order that passengers may have advantage of the 2-cent fare for interstate traveling as well as within the state. All trains will be compelled to stop at the state line stations, giving passengers time to secure 2-cent fare tickets within adjoining states.

On the 22d of November the commission notified all railroads that a 60 per cent. reduction in coal rates would go into effect January 3. The notice was issued after a lengthy conference with Attorney-General West. It specifies that the rate to be established shall be similar to the one maintained in Arkansas.

The board also issued orders requiring the railroads to submit the extent of their holdings to ascertain the value of the properties

and to make known in writing the method employed in leasing rights of way.

November 27 the commission issued a number of orders, including the following: Requiring railroads, in case of wrecks or washouts, to run special trains immediately from both directions; when a regular passenger train is an hour or more late, to run a special on the regular schedule; requiring station agents to report correctly on bulletin boards in conspicuous places the running of trains, showing what the delay, if any; and dispatchers to notify agents truthfully regarding running of trains; requiring railroads to submit all depot plans to the commission for approval before construction is commenced, and in case depots are built at state lines, they must be erected on site selected by the commission; compelling railroads to haul lumber, coal and other products, interstate shipments, at the same rate in Oklahoma as in adjoining states.

An order requiring separate coaches for whites and blacks was issued on the 27th.

At El Reno separate cars will be required, by the city, on the street railroad:

Work on the Panama Canal in 1907.

The annual report of the Isthmian Canal Commission for the fiscal year ended June 30, shows the following financial statement:

Total available appropriations to June 30, 1906..	\$26,990,786
Total appropriation, year 1907.....	25,456,415
Total appropriation, year 1908.....	27,161,367
Total appropriations.....	\$79,608,568
<i>Expenditures.</i>	
Total construction and engineering.....	\$39,452,498
Total civil government.....	2,318,276
Total sanitation.....	5,550,208
Total miscellaneous.....	\$6,442,906
Less.....	5,478,779
	964,127
Total expenditures.....	\$48,285,110
Balance available July 1, 1907.....	31,323,458
Total.....	\$79,608,568

The foregoing tabulated statement of appropriations and expenditures shows that \$79,608,568 have been appropriated for the construction of the canal between the Atlantic and Pacific oceans, and that of this amount, at the close of the fiscal year a total of \$48,285,110 was expended. The project adopted by Congress was estimated by the board of consulting engineers to cost \$139,705,200, exclusive of sanitation and the expenses of the Zone government; the estimates submitted did not contemplate or provide for water-works, sewers and paving in Panama and Colon, made necessary to secure improved health conditions, nor is any provision made for the re-equipment of the Panama Railroad. Under the circumstances, the foregoing table is prepared with a view to showing the amount expended for the construction of the canal on estimates under which the commission is operating.

The completion of the canal will necessitate the abandonment of the present main line of the Panama Railroad, and the preliminary surveys for the location of a new line on the east side of the canal were commenced the latter part of July and completed in November. The location of the line was practically determined in March and involves the excavation of 1,600,000 cu. yds. of material and the placing of 12,000,000 cu. yds. of embankments.

The skilled labor supply from the United States numbered 4,400 on June 30, 1907. The unskilled labor from the West Indies and Europe on this date numbered 4,317 Europeans and 14,600 West Indians. The total labor force was 29,446, compared with 19,600 on June 30, 1906, an increase of nearly 10,000.

From the Culebra division 5,570,432 cu. yds were cut during the year. On the Chagres division only preparatory work was done. In the Colon district the excavation in the year amounted to 1,112,321 cu. yds. From La Boca division 1,235,897 cu. yds. of material were dredged.

West African Railroads.

The work of opening up West Africa by railroads and harbors is one that is proceeding continuously on a large and wise scale, but which attracts little attention from the general public. In Sierra Leone actual construction of the railroad was begun in 1896, and by 1905 222 miles was completed. It is 2 ft. 6 in. gage, and the main line between Freetown and Baüma taps extensive palm oil forests, and serves a large population. There are numerous steel viaducts and long bridges, and, in places, feeders are being built. On the Gold Coast the line from Sekondi, on the coast, to Tarkwa, the center of the mining district, was begun in 1898. In 1900 it was decided to extend to Kumasi, the capital of Ashanti, and this was finished in 1903 after great difficulties. Other lines are projected. In Nigeria the line from Lagos was started in 1896, reaching Ibadan by December, 1900, and is now being extended to Ilorin, some 250 miles from the coast. Great cotton-growing areas are

thus opened up, and will be available as soon as there are harbor facilities to enable steamers and railroads to transship without difficulty.

The British Strike Settlement.

State regulation is a safeguard against socialism. An approach is made to it in the settlement of the threatened railroad strike and consequently extremists in the Labor party are critical and discontented. They think that the trade unionists have been out-manœuvred by Mr. Lloyd-George, President of the Board of Trade, and the railroad chairmen. Free labor rather than trade unionism will be represented in the various conciliation boards, and anything like all-grades cohesion will be impossible. The federation of masters will carry every point when the workmen are split up into sections. The Amalgamated Society, after expending \$35,000 in rallying the workers and getting them to authorize a strike, has enabled non-unionists to talk over grievances and reforms with the railroad directors. It is a victory for free labor rather than the trade union. Yet something has been done. Arbitration is provided automatically, if disputes are not adjusted by conciliation. Thus we have a tentative application of compulsory arbitration to railroad controversies for seven years. For seven years the community has an adequate safeguard against railroad strikes, and a system not differing essentially from compulsory arbitration. Mr. Bell, not being a socialist, pays little heed to the reproaches of extremists. He knows that so stupendous an experiment in collectivism as public ownership cannot be tried under existing financial conditions. Instead of disarming the workmen he has taken all questions relating to wages and hours of railroad servants of every grade out of the hands of the employers and put the directors under bonds to accept the decisions of arbitrators at least for seven years. —*New York Tribune's London Letter.*

Colorado & North-western Subject to Federal Law.

The United States Circuit Court of Appeals at St. Louis on Nov. 29 reversed the decision of the United States District Court in Colorado, which had held that a railroad wholly within a state, though carrying goods consigned from a point in another state, was not subject to the interstate commerce law and to regulation by the Interstate Commerce Commission. The decision is given in the case of the United States against the Colorado & North-western, which operates a narrow gage railroad of 40 miles in Boulder county, Colorado.

The government sued to recover penalties for failure to have air-brakes on freight cars. The Court of Appeals orders a new trial.

The majority opinion, written by Judge Sanborn, of St. Paul, and concurred in by Judge Van Deventer, of Cheyenne, says in part: "Every part of every transportation of articles of commerce in a continuous passage from an inception in one state to a prescribed destination in another state, is a transaction of interstate commerce. The rebilling practised by railroads without any new consent or contracts with the owners could not destroy or affect the interstate character of the shipment or of the transportation. The constitution reserved to the nation the unlimited power to regulate interstate and foreign commerce, and if that paramount power cannot be effectually exercised without affecting interstate commerce, then Congress may undoubtedly, in that sense, regulate interstate commerce."

In a dissenting opinion Judge Phillips, of Kansas City, says: "The philanthropic feature of this prosecution is but the rose in the mailed hand." The inspectors of the Interstate Commerce Commission "discovered this inconsequential, neighborhood road, out in the mountains of Boulder county."

INTERSTATE COMMERCE COMMISSION RULINGS.

No Coast Terminal Rates for Santa Barbara.

The Interstate Commerce Commission has denied the petition of parties in Santa Barbara and Ventura, Cal., that these points be given the benefit of coast terminal rates. The opinion, by Commissioner Lane, says: "Although there is active competition between ocean and rail carriers to Pacific coast points, Santa Barbara does not enjoy such water competition as to compel the installation of terminal rates voluntarily by the carriers. No steamship line from Atlantic ports stops at Santa Barbara. Eastern traffic destined to Santa Barbara and coming by boat is either unloaded at San Diego or at San Francisco, and thence transshipped either by rail or water carrier. In the absence of any showing adverse to the reasonableness of the transcontinental westbound rates to Santa Barbara in and of themselves, we are constrained to deny complainant's petition."

Through Rate Reduced to Sum of Locals.

The Commission has announced its decision in the case of the Coffeyville Vitriified Brick & Tile Company against the St. Louis & San Francisco and the Rock Island. Complainant shipped a car of brick, a through shipment, but the joint through rate was more than the sum of the locals. The complainant asked that the through rate should not exceed the sum of the locals, and for a general ruling that through rates must not exceed the sum of the locals. The Commission decided in favor of complainant on this car but held that it can make no such general ruling; each case must be disposed of upon its own merits.

Commission Divides a Through Rate.

In the case of the Birmingham Packing Company against the Texas & Pacific and others, the Commission established a joint rate of 50 cents per 100 lbs. on cattle from Fort Worth to Birmingham. This rate was put into effect but carriers were unable to agree upon the divisions of the rate and made application to the Commission to fix these divisions. The Commission held that considering the terminal charges of the receiving and the delivering lines and the ferry charge of the intermediate line the rate should be divided upon a mileage basis, but declared that this conclusion should not be taken as implying that all joint rates established by the Commission should necessarily be divided upon a mileage basis.

TRADE CATALOGUES.

Santa Fe Employees' Magazine.—The November number is one of the most interesting numbers of the magazine yet published. The opening article, "Atchison Claims the Honor," tells why that city, rather than Topeka, claims to be the birthplace of the Atchison, Topeka & Santa Fe. "Camels in the Southwest," by Sharlot M. Hall, is reprinted from *Out West*. It tells of the experimental attempt of the Government in 1855 to introduce camels into the Southwest. "The History of the Gulf Lines," "Modern Brake Practice," "Teamwork—Its Power to Win," and "Taking Care of Hot Bearings" are other articles. There is also an account of the dinner and presentation of a chest of silver to Alfred Lovell, the retiring Superintendent of Motive Power, by officers of the mechanical department of the road and others of his friends.

Pipe Coverings and Weather Proof Sockets.—The H. W. Johns-Manville Company, New York, is distributing a folder telling of the advantages of asbestos sponge felted pipe covering. This covering, it is claimed, is particularly advantageous because of its sponginess, which increases its non-conductivity of heat; also because of its long life and because it can be removed and replaced without injuring it. Price lists are given. Another folder issued by the company concerns J-M moulded weather proof mica electric lamp sockets. A photograph shows an incandescent lamp fitted to one of these sockets, the lamp being lit and both lamp and socket immersed in a bowl of water. Price lists for different sizes suited to various makes of lamp are given.

Hydraulic Jacks.—Richard Dudgeon, New York, has published a pamphlet describing his universal hydraulic jack, on which the last patent was taken out on October 15 of this year. The pamphlet devotes some space to the history of the hydraulic jack and then describes in detail the improvements and advantages of the newest form. The types in which the jack is furnished include: plain jack for use in presses or where there is a firm foundation; railroad jack where both stability and portability are required; and the base jack, which has a broader base than the other types. The pamphlet is illustrated with perspective and sectional views of different jacks and their prices. Full dimensions and price lists are given.

Turret Lathes.—The Niles-Bement-Pond Co., New York, has issued a pamphlet describing its rigid turret lathe. It is designed for work ordinarily done on engine lathes, and is especially adapted to work on gear blanks, fly wheels and gas engine cylinders. It can also be used for heavy bar work. It is regularly built in two sizes: 21-in. and 28-in. Different views of the machine show its advantages, and a series of line drawings show the kinds of work which can be done on it.

Gas Engines.—The Lazier Gas Engine Co., Buffalo, N. Y., has issued a pamphlet describing multiple cylinder vertical gas engines. Tables showing comparative operating costs of producing 100 h.p. by simple and compound steam engines, by electricity and by engines using illuminating, natural and producer gas are given. The pamphlet is well illustrated with perspective and sectional views of the Lazier two-cylinder engine and its important parts.

Rheostats.—Bulletin No. 4,532 of the General Electric Co., Schenectady, N. Y., describes some direct-current motor starting

rheostats in sizes up to 50 h.p. and 550 volts. There are two types, S. A. and S. O. Each type has the no-voltage release attachment, which allows it to be used with either shunt, compound or release wound motors, while the type S. O. has an overload coil in release with the motor armature. In the smaller sized rheostats, a new resistance unit is used, known as form P. The wire is wound on a tube, which is afterwards coated inside and out with a reinforcing compound, then fitted with porcelain bushings at each end and finally baked.

Track Drills.—The Cook Standard Tool Co., Kalamazoo, Mich., has issued a pamphlet on labor saving track appliances. Most of the space is devoted to the Climax track drill made by the company. The Standard track tool grinder and Cook's combination chuck are also illustrated and described in this connection. Prices of bits and parts of the grinder and of the track drill are given. Cook's steel and wooden cattle guards are also illustrated. The company also makes car and track jacks.

Rock Island Employees' Magazine.—The December number is the sixth to be issued. "The Passing of the Hobo" and "The Rock Island Testing Department," are the chief articles. Other shorter articles of interest describe the dining car service of the Rock Island, tell why it is better for a railroad to buy equipment and supplies rather than manufacture them, and how and why the Rock Island now erects its own steel bridges.

Water Gage.—A folder issued by the Ashcroft Manufacturing Co., New York, describes the Ashcroft prismatic water gage. The glass is fluted on the inner surface so that it gives a prismatic effect, breaking up the light so that the water shows black and the steam space looks silvery; the water level is thus most clearly indicated. Price lists of different types and parts are given.

Storage Batteries.—Catalogue T, of the Westinghouse Machine Company, East Pittsburgh, Pa., deals with portable storage batteries. Types suitable for electric vehicles and for car lighting are illustrated and described, with weights, capacity and price for each type and size. This is the first catalogue which the company has issued dealing with portable storage batteries.

Valves.—Catalogue H, of the Nelson Valve Co., Philadelphia, Pa., describes globe valves, check valves and gate valves of different types for various uses. Full dimensions and price lists are given of both valves and parts. The larger sizes are made up to 24 in. diameter of pipe. The catalogue is fully illustrated with half-tones and line drawings.

MANUFACTURING AND BUSINESS.

John C. McMynn has resigned his position with Robert W. Hunt & Co., Chicago.

The name of the Dominion Dump Car Co., Ltd., Montreal, Que., owner of Canadian patents for Hart convertible side and center ballast cars and Otis drop bottom dump, coal and ore cars, has been changed to the Hart-Otis Car Co.

W. H. S. Wright, St. Paul, Minn., representative of the Railway Steel-Spring Company, New York; the Adams & Westlake Company, Chicago; the Latrobe Steel & Coupler Company, Philadelphia, and the Railway Materials Company, Chicago, died on November 28.

The Expanded Metal & Corrugated Bar Co., St. Louis, Mo., has shipped 1,000 tons of open-hearth steel corrugated bars for the United States Reclamation Service. The bars are being used on irrigation works in connection with the Tieton project. This order is one of several for corrugated bars for irrigation work.

The new locomotive shops of the Grand Trunk at Stratford, Ont., are to be equipped with 55,000 sq. ft. of Paradigm skylights by Arthur E. Rendle, of Montreal, Que.; New York and Chicago. Mr. Rendle also has the contract for about 17,000 sq. ft. of skylights for the Grand Trunk car shops at London, Ont.

F. Weber & Co., Philadelphia, Pa., makers and importers of artists' materials and draftsmen's and engineers' supplies, have been made sole agents in the United States for Fabriano hand-made drawing paper. This paper, which is made in Italy, is furnished in three styles, with surface suitable for pen, pencil and water color work.

Iron and Steel.

We are informed, generally but indefinitely, by the United States Steel Corporation, that correspondence and inquiries from railroads concerning rail orders for 1908 delivery are much increased, and that the situation is distinctly encouraging. It is believed that

the rail makers and the railroads generally are in accord and accept as settled all of the specifications upon which agreement was reported by the rail committee of the American Railway Association, and that this, by so much, clears the air and helps the situation. The one remaining unsettled rule as to discard from the ingots and, also, the price are for the present the sole subjects of inquiry.

OBITUARY NOTICES.

Robert Angst, Chief Engineer of the Duluth & Iron Range, died at Duluth, Minn., on November 30 after a short illness. Mr. Angst was 60 years old.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, etc., see advertising page 24.)

Engineers' Club of Philadelphia

At a business meeting to be held December 7 a paper on "Foundations," by A. B. Clark, illustrated by lantern slides, will be presented.

Franklin Institute.

At a section meeting of the Institute, December 5, the subject was "Process and Apparatus for the Production of Carbon Bi-Sulphide in the Electric Furnace," by Edward R. Taylor, of Penn Yen, N. Y.

American Society of Civil Engineers.

At a regular meeting of this society December 4 a paper on "Invar (Nickel-Steel) Tapes on the Measurement of Six Primary Base Lines," by Owen B. French, was presented for discussion. This paper was printed in the October number of "Proceedings," 1907.

Railway Signal Association.

The next meeting of this association will be held at the Engineering Societies' building, 29 West 39th street, New York City, Tuesday, January 14, 1908. At that meeting there will be a paper on "Economical Operation of Electric Signals and the Care of Storage Batteries," by T. R. Cook.

Canadian Society of Civil Engineers.

At a meeting of the general section Dec. 5 a discussion took place on the paper by T. M. Fyshe entitled "Discussion, Designs and Specifications for a Reinforced Concrete Bridge Abutment," which was read at the October 17 meeting.

A paper by J. S. Armstrong entitled "Schemes Showing the Possibilities of St. John, N. B., as a Great Port, and how the Interior of New Brunswick can be Opened up to Ocean Traffic," was also read by the author.

Wood Preservers' Association.

The fourth annual meeting of the Wood Preservers' Association is to be held in Kansas City, Mo., on the third Tuesday in January, 1908. The headquarters will be at the Baltimore Hotel. The topics for discussion are as follows: Impurities of foreign matters in creosote oil that should be avoided. Cylinder cars, tracks and guard rails; how they should best be constructed. Should the supply tank be overhead or under ground? Best methods of measuring oil. Best method of impregnating wood with preservatives of ordinary use, when pressure is not available. Method of treating wood that is refractory to treatment, and at the same time very subject to decay. Results thus far accomplished in the United States in preserving wood. Discuss best method of treating piles to use in southern waters. Can freshly cut timber be well treated, and how? Best method of keeping records of treated ties in the track. Compilation of various data in reference to the life of treated timbers, especially ties, in the United States under all treatments. Best practice of treating butts of telegraph poles, telephone poles and signal poles. Is it necessary, practical or otherwise, to correct oil measurements for temperature?

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Chicago & Alton.—Theodore P. Shonts, President of the Toledo, St. Louis & Western and of the Interborough-Metropolitan, has been elected also President of the Chicago & Alton. George H. Ross, Second Vice-President and General Traffic Manager of the T., St. L. & W., has been elected also Vice-President of the C. & A.

Cincinnati Southern.—D. G. Edwards, formerly General Passenger Agent of the Cincinnati, Hamilton & Dayton, has been appointed a Trustee of the Cincinnati Southern, succeeding Amor Smith, Jr., resigned. This road is owned by the city of Cincinnati and leased to the Cincinnati, New Orleans & Texas Pacific.

International & Great Northern.—H. W. Clarke, Superintendent of Transportation of the Mobile & Ohio, has been elected Second Vice-President and General Manager of the International & Great Northern, effective January 1, succeeding Leroy Trice, resigned.

Kansas City Southern.—F. W. Meyer, freight and passenger accountant, has been appointed Assistant Auditor, succeeding E. P. Hall, resigned to go to another company.

Louisville & Nashville.—T. B. Harrison, Jr., General Attorney, with office at Louisville, Ky., has resigned to practice law in New York City.

Tampa & Jacksonville.—H. W. Waite has been appointed Auditor, with office at Gainesville, Fla., succeeding C. R. Wood, resigned.

Toledo, St. Louis & Western.—See Chicago & Alton.

Operating Officers.

Boston & Albany.—J. L. Truden, Acting Superintendent of the Albany division, has been appointed Superintendent of that division, with office at Springfield, Mass. Charles Firth, formerly Superintendent of this division, is now agent at Worcester, Mass. T. W. Carter has been appointed Trainmaster of the Boston division.

Chicago Great Western.—Otto Cornelison, Superintendent of Transportation, has been appointed General Superintendent, with office at St. Paul, Minn., succeeding G. A. Goodell. See Great Northern.

Chicago, Rock Island & Pacific.—M. L. Ellis, chief despatcher at Goodland, Kan., has been appointed Assistant Trainmaster at Limon, Kan.

Durham & Charlotte.—John H. Kennedy, Auditor, has been appointed also General Manager, with office at Gulf, N. C.

Great Northern.—G. A. Goodell, General Superintendent of the Chicago Great Western, has been appointed General Superintendent of the Central district of the Great Northern, with office at Minot, N. Dak.

Louisiana Railway & Navigation.—E. C. Hastings has been appointed General Agent at Kansas City, Mo.

Mexican Central.—J. N. Galbraith, who resigned last summer as General Manager of the Tehuantepec National, has been appointed General Manager of the Mexican Central.

Mobile & Ohio.—E. C. Rendell, chief clerk to the Superintendent of Transportation, has been appointed Superintendent of Transportation, succeeding H. W. Clarke. See International & Great Northern.

Northern Pacific.—F. S. Rawlins, Superintendent of Transportation of the Kansas City Southern, has been appointed Trainmaster of the Northern Pacific at Missoula, Mont.

Rio Grande Southern.—A. S. Meldrum, General Superintendent, has resigned and the office has been abolished. C. D. Wolfinger has been appointed Acting Superintendent, with office at Ridgway, Colo.

St. Joseph & Grand Island.—James Berlingett, General Superintendent, has been appointed to the new office of General Manager, with office at St. Joseph, Mo.

Southern Pacific.—J. W. Metcalf has been appointed Assistant Superintendent at Los Angeles, Cal., succeeding T. McCaffery, resigned.

Traffic Officers.

Chicago & North-Western.—J. E. Brittain, General Agent of the passenger department at Boston, Mass., has been appointed General Agent of both the freight and passenger departments at that city, assuming the duties of C. H. Wise, General Agent of the freight department, who has been assigned to other duties.

Delaware & Hudson.—Duncan I. Roberts, formerly General Passenger Agent of the Erie, has been appointed General Canadian Freight and Passenger Agent of the Delaware & Hudson and General Passenger and Freight Agent of the Quebec, Montreal & Southern. Mr. Roberts, who is 54 years old, was born in Pennsylvania and began railroad work in 1873 as a clerk in the office of the General Freight Agent of the Pittsburgh, Cincinnati & St. Louis. He worked up through the car service and traffic departments, being made district passenger agent of the road in 1885. The next year he was made Assistant General Passenger Agent of the Pennsylvania Lines West, and in 1890

went to the New York, Lake Erie & Western, now the Erie, as Assistant General Passenger Agent at Chicago. He was General Passenger Agent of the Erie from 1891 to 1901. He was then for three years Vice-President of the Little Kanawha and President of the Marietta, Columbus & Cleveland. He has been out of railroad service since 1905.

Intercolonial.—D. A. Story, division freight agent at Halifax, N. S., has been appointed General Freight Agent, with office at Moncton, N. B., succeeding J. J. Wallace, who retired last August.

Missouri Pacific.—H. B. Kooser, General Agent at Dallas, Tex., has been appointed General Agent at Omaha, Neb., succeeding J. O. Phillippi, resigned. S. W. Bradford succeeds Mr. Kooser.

Quebec, Montreal & Southern.—See Delaware & Hudson.

St. Louis, Brownsville & Mexico.—The office of William Doherty, Traffic Manager, has been moved from Corpus Christi, Tex., to Kingsville.

Engineering and Rolling Stock Officers.

Boston & Albany.—L. G. Morphy, Assistant to the Principal Assistant Engineer of the New York Central & Hudson River, has been appointed Assistant Engineer of Maintenance of Way and Construction of the Boston & Albany, with office at Boston, Mass.

New York Central & Hudson River.—S. P. Hull, Engineer of Signals, has been appointed Engineer of Maintenance of Signals, with office at New York City, with authority over all divisions except the Electric division. He will report to the General Superintendents. W. H. Elliott, an Assistant Signal Engineer of the Electric division, succeeds Mr. Hull, with office at New York, with authority over all divisions except the Electric division. See Boston & Albany.

Purchasing Agents.

Chicago & Alton.—The authority of E. S. Wortham, Purchasing Agent of the Toledo, St. Louis & Western, has been extended over the Chicago & Alton. E. V. Dexter, Purchasing Agent of the Chicago & Alton, has been appointed to the new office of General Inspector of Fuel, Equipment and Material.

Toledo, St. Louis & Western.—The office of the Purchasing Agent has been moved from Toledo, Ohio, to Chicago. See Chicago & Alton.

LOCOMOTIVE BUILDING.

The Peoria & Pekin Union has ordered three switch engines from the American Locomotive Company.

The Grand Trunk, which was reported to be in the market for locomotives in the *Railroad Gazette* of July 19, 1907, has ordered 10 simple mogul (2-6-0) locomotives for September, 1908, delivery; 10 simple switching (0-6-0) locomotives for August, 1908, delivery; 10 simple ten-wheel (4-6-0) locomotives for May, 1908, delivery, from the Baldwin Locomotive Works, and 20 Richmond compound consolidation (2-8-0) locomotives for September, 1908, delivery from the Locomotive & Machine Company of Montreal. The specifications are as follows:

General Dimensions.	
Type of locomotive	Mogul.
Weight, total	161,976 lbs.
Weight, on drivers	138,176 "
Cylinders	20 in. x 26 in.
Diameter of drivers	63 in.
Boiler, type	Ext. wagon top.
" steam pressure	200 lbs.
" outside diameter at smallest ring	62 in.
" tubes, No.	283
" tubes, diameter	2 in.
" tubes, length	11 ft. 11 in.
Firebox, length	120 in. inside.
" width	40½ in. inside.
" depth	76¾ in. front.
" depth, back	65 in. back.
Heating surface, tubes	1,803 sq. ft.
" firebox	188 "
" total	1,991 "
Grate area	33.43 "
Tender	
Truck	Grand Trunk stand. with wooden bolster.
Water capacity	6,000 gals.
Coal capacity	10 tons.

General Dimensions.

General Dimensions.	
Type of locomotive	Switching.
Weight, total	139,500 lbs.
Weight, on drivers	139,500 "
Cylinders	20 in. x 26 in.
Diameter of drivers	56 in.
Boiler, type	Straight.
" steam pressure	190 lbs.
" outside diameter at smallest ring	66 in. inside.
" tubes, No.	264
" tubes, diameter	2 in.
" tubes, length	12 ft. 9½ in.
Firebox, length	98½ in. inside.
" width	40½ in. inside.
" depth	69 in. front.
" depth, back	67 in. back.
Heating surface, tubes	1,772 sq. ft.
" firebox	148 "
" total	1,920 "
Grate area	27.44 "
Tender	Hopper style.
Truck	Grand Trunk stand. with wooden bolster.
Water capacity	5,000 gals.
Coal capacity	8 tons.

General Dimensions.	
Type of locomotive	Consolidation.
Weight, total	211,200 lbs.
Weight, on drivers	184,800 "
Cylinders	22½ x 35 x 32 in.
Diameter of drivers	63 in.
Boiler, type	Ext. wagon top.
" steam pressure	210 lbs.
" outside diameter at smallest ring	67 in.
" tubes, No.	353
" tubes, diameter	2 in.
" tubes, length	15 ft.
Firebox, length	96½ in. inside.
" width	75½ in. inside.
" depth	72¾ in. front.
" depth, back	56½ in. back.
Heating surface, tubes	2,757.1 sq. ft.
" firebox	168.2 "
" total	2,925.3 "
Grate area	50.62 "
Tender	Hopper style; water bottom.
Truck	Grand trunk stand.; metallic bolster.
Water capacity	7,000 gals.
Coal capacity	10 tons.

The San Antonio & Aransas Pass, it is said, has decided not to order the ventilated box cars and the plain box cars on which they asked bids, as reported in the *Railroad Gazette* of November 29.

The Galveston, Houston & Henderson, as reported in the *Railroad Gazette* of August 9, has ordered two six-wheel switching (0-6-0) locomotives from the Baldwin Locomotive Works.

General Dimensions.

General Dimensions.	
Type of locomotive	Switching
Weight, total	120,000 lbs.
Diameter of drivers	51 in.
Cylinders	19 in. x 24 in.

The Grand Trunk Pacific, which was reported to be in the market for locomotives in the *Railroad Gazette* of July 19, 1907, has ordered 30 simple American (4-4-0) locomotives from the Locomotive & Machine Company of Montreal for March to July, 1908, delivery, and 20 simple American (4-4-0) locomotives from the Canada Foundry Company, Toronto, for April to August, 1908, delivery. The specifications are as follows:

General Dimensions.

General Dimensions.	
Type of locomotive	American
Weight, total	121,688 lbs.
Weight, on drivers	74,060 "
Cylinders	18 in. x 24 in.
Diameter of drivers	69 in.
Boiler, type	Extended wagon top
" steam pressure	200 lbs.
" outside diameter at smallest ring	55½ in.
" tubes, No.	210
" tubes, diameter	2 in.
" tubes, length	11 ft. 2¾ "
Firebox, length, inside	95¾ "
" width, inside	41¾ "
" depth, front	63 "
" depth, back	50 "
Heating surface, tubes	1,259 sq. ft.
" firebox	126 "
" total	1,385 "
Grate area	28 "
Tender	Hopper style, water bottom
Truck	Grand Trunk standard with cast-steel bolster
Water capacity	7,000 gals.
Coal capacity	10 tons

CAR BUILDING.

The Northern Pacific is reported to be considering the purchase of new passenger equipment for the coming year.

The Utilization Co., Grand Rapids, Mich., has ordered two steel gondola cars of 100,000 lbs. capacity from the Pressed Steel Car Co., for January, 1908, delivery. These cars will be 40 ft. 4 in. long, 9 ft. 4¾ in. wide and 4 ft. 6 in. high, inside measurements. The special equipment includes:

Brakes	Westinghouse
Couplers	Climax

The Northwestern Pacific has ordered 13 coaches, one mail and express car and one baggage car from the American Car & Foundry Company. The coaches will weigh 88,000 lbs., and will measure 67 ft. 8¾ in. long, 10 ft. ¾ in. wide and 14 ft. 1½ in. high, over all. The special equipment includes:

Brake-beams	Diamond special
Brake-shoes	Diamond S, flanged
Brakes	Westinghouse
Couplers	Janney
Curtain fixtures	Forsythe
Curtain material	Pantasote
Draft rigging	Sessions
Heating system	Frumveller
Light	Pintsch
Paint	Sherwin-Williams
Vestibules	Pullman

RAILROAD STRUCTURES.

BUFFALO, N. Y.—The New York Central & Hudson River, it is said, has plans made for at once putting up a new roundhouse to cost about \$125,000.

The New York Central & Hudson River, it is said, will build

a new swing bridge to be operated by electricity to replace the present structure connecting with Tonawanda Island.

HOUSTON, TEX.—The Colorado Southern, New Orleans & Pacific, it is said, has given a contract to the Union Bridge Company, of Kansas City, Mo., for building the sub-structure for a bridge over the Trinity river. There will be four piers.

MISSION CITY, B. C.—A proposition is under consideration to build a combined steel highway and railroad bridge, to replace the present wooden bridge over the Fraser river.

NEW YORK, N. Y.—Plans have been filed by the New York City Railway Co. for a new office building and car-house to be built at the northwest corner of Lenox avenue and 146th street, adjoining the power station and car shops in 146th street, which were damaged by fire last April. The new building is to be of brick, two stories high, fronting 199.10 ft. on the avenue and having a depth of 469 ft. on 147th street. It is to cost \$400,000. The power station and shops are to be finished about the same time, making of them a four-story building as originally designed, the work of completion costing an additional \$25,000.

PRESCOTT, ONT.—The Canadian Pacific, it is said, will spend \$40,000 on its yards here this winter. An appropriation of \$100,000 has been made for a new station.

VICTORIA, B. C.—A contract has been given by the British Columbia Electric Railway Company to W. A. Gleason, of Victoria, at \$10,000 to put up a brick car barn 82 ft. x 200 ft.

WILLOW, CAL.—The bridge to be built over the Sacramento river here by the Northern Electric Railway Company of Chico, is to be a combined railroad and toll bridge 570 ft. long.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ABERDEEN & TOMBIGBEE.—The surveys for this proposed line have been made. It is from Okolona, Miss., southeast via Woodson, Aberdeen and Columbus to Pickensville, Ala., 65 miles, of which 59 miles is in Mississippi and six miles in Alabama. Grading is finished between Okolona and Aberdeen 17.5 miles, also from Columbus to Pickensville, 11.5 miles. The company is building the line with its own men. W. T. McKee, Chief Engineer, Aberdeen, Miss.

AKRON & YOUNGSTOWN (ELECTRIC).—Rights of way are reported secured and application has been made in Ohio for a charter by a company under this name with a capital of \$100,000. The company proposes to build an electric line from Akron, Ohio, east to Youngstown, about 50 miles. T. L. Childs, E. F. Veris, Judge J. A. Kohler and others are interested.

ATCHISON, TOPEKA & SANTA FE.—The Guthrie, Fairview & Western, chartered early in 1904 to build a line from Guthrie, Okla., west through Logan, Kingfisher, Blaine and Woods counties to Fairview, to a connection with the Kansas City, Mexico & Orient main line, has been sold to the Santa Fe. J. S. McCaul was the promoter and general manager of the line. The company had a portion of its proposed route graded west from Darrow in Blaine county and some track laid within the city of Guthrie. Valuable traffic arrangements had been made with the Denver, Enid & Gulf and other Oklahoma roads.

CANADIAN NORTHERN.—Application will be made to Parliament by this company to build extensions in the west as follows: Humboldt, Sask., southwest to Calgary; Brandon-Regina line near west boundary of Manitoba west to Lethbridge, Alb.; North Battleford, northwest to Athabaska Landing with a branch to Green Lake; Strathcona, Alb., south to Calgary, with a branch to connect with authorized line from Regina to Red Deer river; Regina southwest to international boundary; Edmonton to headwaters of McLeod and Brazeau rivers; Russell, Man., via Yorkton to authorized line near Goose Lake, Sask.; south of Neepawa, Man., to main line crossing of South Saskatchewan river. Application will also be made for extending the time for commencement and completion of the following lines: North of the line between Winnipeg and Ste. Anne to international boundary; between Port Arthur and Fort Frances to Quebec, with branches to Port Arthur, Ottawa and Montreal; Battleford west to the Brazeau river; Regina to Humboldt and via Carrot river to Pas Mission, and between Humboldt and South Saskatchewan river to crossing of same river south of Prince Albert; and to authorize the increase of the capital stock of the company by \$19,250,000.

CANADIAN NORTHERN ONTARIO.—This company will apply to Parliament for authority to build a line from a point on the line already authorized between Udney and Rathburn, to Orillia.

CANADIAN PACIFIC.—According to reports from the state of Washington, this company is making surveys for two lines, one from Spokane through the Yakima valley across the Cascade mountains to Tacoma and Seattle, and the other a connecting north and south line from Sumas on the international boundary to Seattle and Tacoma. Permanent surveys have already been made for a coast line from Sumas south to Deming, 40 miles. The company, it is said, has options on 200 acres of Tacoma deepwater terminals.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Contracts are reported let by this company for straightening its line and reducing grades from Bellefontaine, Ohio, north to Harper, about six miles.

DELAWARE & HUDSON.—Work on the contract given to O'Brien

& Mularkey, of Montreal, extending the Quebec, Montreal & Southern from Pierreville, Que., to St. Jean des Chaillons, 48½ miles, towards Quebec, has made satisfactory progress. About three-fourths of the tracks are on the ground and sub-structures of the bridges at Nicolet, Becancourt and East Gently as well as for several smaller structures are about finished. Contracts for an additional 41 miles will probably be let this winter. (March 15, p. 383.)

FLORIDA EAST COAST.—In reply to the report that work had been abandoned last spring on the Key West extension of this road, L. Larson, Northwestern Agent, is quoted as follows: A large force of men has been at work all summer, and the number has been increased to 3,000 to finish the line as far as Knight's Key, 50 miles from Key West, this year.

GEORGIA ROADS (ELECTRIC).—Surveys are being made by the Columbus Power Co. for an electric line to be built from Columbus, Ga., north along the Chattahoochee river to West Point, 34 miles.

GRAND TRUNK PACIFIC.—G. O. Leask, Assistant Chief Engineer of this company in the West, announces that the final route through the Rocky mountains has been located through the Yellow Head Pass. The surveyors are now working on this route from the pass to the Nechaco and Bulkley valleys. This section of the road will be 400 miles long and 150 men will be engaged on the surveys all winter. The company is planning to begin construction work in the mountains in the spring. Two years will be required to complete the road from Edmonton to the Pacific coast.

GUTHRIE, FAIRVIEW & WESTERN.—See Atchison, Topeka & Santa Fe.

HOUSTON & TEXAS CENTRAL.—See Missouri, Oklahoma & Gulf.

IDAHO & WASHINGTON NORTHERN.—This company was incorporated last April in Idaho with \$5,000,000 capital to build a line from McGuire's Station, Idaho, on the Coeur d'Alene & Spokane division of the Spokane & Inland Empire north to Newport, Wash., thence north along the Pend d'Oreille river to Metaline near the British Columbia boundary. The line is finished from McGuire's Station to Newport, 51 miles, including a seven-mile branch. F. A. Blackwell, President, Coeur d'Alene.

ILLINOIS CENTRAL.—The new double-track belt line, which this company has been building around Memphis, Tenn., is to be put in operation about the first of next year. (Oct. 4, p. 403.)

INTERCOLONIAL.—Hon. George P. Graham, Canadian Minister of Railways, states that a large amount of money is being spent for improvements on this road. New concrete shops and terminals are being constructed at Moncton, N. B., large enough to accommodate the Grand Trunk Pacific as well as the Intercolonial. A contract for a gas-producer plant for the supply of power and light has been let. Double-tracking work has been started from Moncton to Halifax. New and heavier bridges are being put in on the line of the old Canada Eastern from Chatham, N. B., to Fredericton, which is now part of the government system.

LIMA & TOLEDO TRACTION.—This company, it is said, has opened part of the extension it is building from Leipsic, Ohio, north to Toledo on the section from Leipsic north to Deshler, about 10 miles. (Nov. 15, p. 665.)

MISSOURI, KANSAS & TEXAS.—Engineers are laying out extensive improvements in the yards and on the main line of this road near McAlester, Ind. T. This change is in accord with the plan to double-track the entire line from Denison, Tex., north to Muskogee and later to Parsons, Kan.

MISSOURI, OKLAHOMA & GULF.—This company, operating a line from Wagoner, Ind. T., south to Dustin, 75 miles, is building an extension north to Joplin, Mo., 120 miles. It is said that the road is now the property of E. H. Harriman and associates. The northern extension is to be continued north to a connection with the Union Pacific at Lawrence, Kan., 240 miles, and on the south from Dustin south to Denison, Tex., 128 miles. The new road will give the Harriman system in Texas and the Southwest a direct outlet to the Middle West and the Northwest. It will connect with the Houston and Texas Central at Denison. Construction work is now in progress south of Wagoner, Okla. A gap of about 45 miles remains to be built between the two places. The final location of the route north from Wagoner to Lawrence is being made. The building of an outlet for the Harriman lines in Texas was made necessary by the recent completion of the Trinity & Brazos Valley between North Texas points and Houston. The traffic of the Rock Island, the Frisco and the Colorado & Southern, which formerly went to the Houston & Texas Central, is now being turned over to the Trinity & Brazos Valley. (Nov. 1, p. 541.)

NORTH & SOUTH.—Surveys are being made for this proposed line from Portsmouth, Ohio, south to Pound Gap, Ky., 180 miles. Construction is to be started in the spring. The line lies through

a rich ore territory. Major T. J. Kirkpatrick and Dr. L. E. Niles, of Springfield, Ohio, are interested. E. Parsons, Chief Engineer.

NORTH-WESTERN PACIFIC.—Application will be made to incorporate this company, which proposes to build a line from Fort Churchill on Hudson Bay west to the Pacific coast. Murphy & Fisher, 46 Elgin street, Ottawa, are the Attorneys.

ONTARIO & WEST SHORE (ELECTRIC).—This company, with office at Goderich, Ont., proposes to build an electric line from Goderich northeast to Owen sound, about 75 miles.

PENNSYLVANIA.—Plans are reported made by this company to double-track the Belvidere division from Trenton, N. J., north to Manunka Chunk. Work is to be started in the spring.

PUBLIC SERVICE CORPORATION OF NEW JERSEY.—President T. N. McCarter is quoted as follows: The Public Service Corporation is now operating all the gas and electric properties which it controls, having merged them into a new company known as the Public Service Railway Company. The company has decided for the present to stop new construction on every work that will bear postponement.

PUBLIC SERVICE RAILWAY.—See Public Service Corporation.

QUEBEC, MONTREAL & SOUTHERN.—See Delaware & Hudson.

ST. LOUIS & SAN FRANCISCO.—President A. J. Davidson, of this company, is quoted as saying that it is expected that trains of the Frisco will be running from St. Louis direct into Dallas over the Carrollton and Irving cut-off by January 1. Track laying is finished. (March 11, p. 391.)

TEMISKAMING & NORTHERN ONTARIO.—Plans are under consideration by the Ontario Railway Commission to reduce the grades from 1.25 per cent. to 0.5 per cent. on 21 miles of this railroad from a point ten miles north of North Bay, Ont. The road will be made seven miles longer but the grade-reduction will more than offset the loss.

TEXAS & NEW MEXICO.—Surveys have been made by this company for 80 miles, and grading has been finished on four miles of its proposed line from McKinney, Tex., west via Denton, Krum, Bridgeport and Jacksboro to a point 175 miles west of McKinney. Contract has not yet been let for the work. The company wants to negotiate with a railroad contractor to form a construction company to finish the line. Right-of-way and the sites for terminals are assured. W. J. Healy, V.P., McKinney.

UNITED RAILWAYS COMPANY OF ST. LOUIS.—John I. Beggs, President of this company and the Laclede Gas Light Company, is quoted as saying that all employees of the construction and extension departments of these corporations, as well as of the Union Electric Light & Power Company, have been laid off indefinitely. No new work is to be carried out until conditions change and confidence is restored.

VALLEY RIVER.—This company, with office at Mill Creek, W. Va., is said to be buying material to build its proposed line from Mill Creek southwest to Clover Lick, 43 miles. Surveys made and right-of-way and capital partly secured. W. A. Dromgold, President, York, Pa.; J. G. Hoffman, Jr., Vice-President; L. E. Shull, General Manager; John Alden, Chief Engineer, Elkins, W. Va. (July 12, p. 54.)

WICHITA FALLS & NORTHWESTERN.—Announcement is made that this company has opened its line for freight and passenger service between Wichita Falls, Tex., and Frederick, Okla., 50 miles. (Sept. 13, p. 308.)

RAILROAD CORPORATION NEWS.

ALABAMA GREAT SOUTHERN.—The \$1,750,000 first mortgage 6 per cent. bonds maturing January 1, 1908, are to be extended to December 1, 1927, with interest at 5 per cent. The Guaranty Trust Company, New York, which is receiving deposits of the present bonds up to December 20, 1907, for extension, will pay the January 1, 1908, coupon on each bond as soon as deposited.

BURR'S FERRY, BROWNDAL & CHESTER.—The Texas Railroad Commission has given this company permission to register an issue of \$165,000 bonds on 11 miles of completed road from Rockland, Tex., west. The road has been in operation from Aldridge to Rockland, eight miles, for some months, and is being extended to Browndal, 22 miles. It is projected from Chester, on the Missouri, Kansas & Texas, east via Rockland and Browndal to Burr's Ferry, 80 miles.

CANADIAN NORTHERN.—This company is to ask the Canadian Parliament for permission to increase its authorized capital stock from \$30,750,000 to \$50,000,000.

CHICAGO, BURLINGTON & QUINCY.—This company, according to press despatches, has bought the Colorado & Wyoming, a subsidiary of the Colorado Fuel & Iron Company. It has \$100,000 capital stock and \$4,500,000 first mortgage 4 per cent. bonds of 1953 outstanding. It owns 53 miles of road, of which 15 miles are from Hartville Junction, Wyo., to Sunrise, connecting with the Burlington at Guernsey and with the Colorado & Southern at Hartville Junction. The rest of the mileage is mostly in Colorado without connection with the road in Wyoming.

COLORADO & WYOMING.—See Chicago, Burlington & Quincy.

EVANSVILLE RAILWAYS.—This company, which was incorporated last June as a consolidation of the Evansville & Eastern Electric and the Evansville & Mount Vernon Electric, has issued \$500,000 6 per cent. cumulative preferred stock. The company has \$900,000 common stock outstanding and operates 38 miles of road from Newburg, Ind., to Rockport and from Evansville to Mount Vernon, with a three-mile branch. It has trackage rights from Newburg into Evansville.

HOCKING VALLEY.—See Kanawha & Michigan.

ILLINOIS CENTRAL.—A circular signed by most of the directors has been sent to stockholders. The circular reiterates the criticisms already made of Mr. Fish's actions while President.

INTERBOROUGH-METROPOLITAN.—The \$3,000,000 6 per cent. six months' notes sold last May are to be taken care of by paying 30 per cent. in cash and extending the remainder for about six months at 6 per cent. These notes were to have been retired with the proceeds of part of the \$15,000,000 collateral trust 5 per cent. three-year notes which were authorized last spring, but never issued.

KANAWHA & MICHIGAN.—Of the \$2,500,000 second mortgage 20-year 5 per cent. bonds authorized last June, \$2,078,000 have been issued. The proceeds have been used to pay off the \$1,095,000 special equipment and betterment loan and other debts to the Hocking Valley and the Toledo & Ohio Central.

ST. JOSEPH & GRAND ISLAND.—This company is one of the few to show large increases in net earnings for the fiscal year ended June 30, 1907. There was but a slight increase in operating expenses, the increased cost of conducting transportation being nearly offset by a decrease in the amount spent on maintenance of way and structures, while maintenance of equipment increased a little. The accrued surplus on hand at the end of the year was \$982,417. The company has \$5,500,000 5 per cent. non-cumulative first preferred stock, \$3,500,000 4 per cent. non-cumulative second preferred and \$4,600,000 common. The Union Pacific acquired, in 1906, 63 per cent. of the common, 17 per cent. of the first preferred and 36 per cent. of the second preferred. No dividends have been paid on the first preferred since 1902 and none have ever been paid on the other classes. The surplus earned last year would be just enough to pay full dividends on both classes of preferred. Nothing was appropriated out of earnings for betterments in 1907. In the previous year \$62,000 was so spent. The income account is as follows:

	1907.	Change.
Gross earnings	\$1,734,558	Inc., \$212,511
Operating expenses	1,068,844	" 4,581
Net earnings	665,713	" 207,930
Taxes, interest and betterments	247,379	Dec., 67,475
Surplus for the year	418,335	Inc., 275,406

TOLEDO & OHIO CENTRAL.—See Kanawha & Michigan.

TOLEDO RAILWAY & TERMINAL.—A reorganization plan for this property, sold under foreclosure last May to a committee of the bondholders, has been prepared. A new company is to be organized with \$6,000,000 capital stock and \$6,000,000 4½ per cent. 50-year bonds. Of the bonds \$4,000,000 are to be issued and the remainder reserved for extensions, etc. The \$382,856 accrued interest on the old \$3,500,000 4½ per cent. bonds is to be paid in new bonds and cash at the rate of \$100 in bonds and \$10 in cash for each \$110 of interest. The Pere Marquette, the Cincinnati, Hamilton & Dayton, the Pennsylvania Company, the Lake Shore & Michigan Southern, the Michigan Central, the Grand Trunk Western and the Toledo, St. Louis & Western are to guarantee the new bonds, and the entire capital stock is to be held by these companies as follows: Pere Marquette and Chicago, Hamilton & Dayton, 20 per cent. each, and the other five companies, 12 per cent. each.

UNDERGROUND ELECTRIC OF LONDON.—Speyer & Co., New York, and their allied banks abroad, have arranged to buy at face value the coupons falling due December 1 of the \$33,000,000 5 per cent. profit-sharing notes, whose principal is due June 1, 1908. A plan is being prepared for the extension and conversion of the notes and the raising of additional money, and the note-holders are asked to deposit their holdings for provisional agreement with the plan with the Guaranty Trust Company, New York.